The
OHIO STATE UNIVERSITY
BULLETIN

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GRADUATE SCHOOL

1932-1933

PUBLISHED BY THE UNIVERSITY AT COLUMBUS

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GRADUATE SCHOOL

1932-1933

THE OHIO STATE UNIVERSITY
COLUMBUS

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UNIVERSITY CALENDAR

1932

SUMMER QUARTER

May 31 to June 4	Entrance Examinations.
June 17 to 24	Physical Examinations for all new students.
June 20	Latest day for registration and payment of fees without penalty. (See page 18.)
June 21	Classes begin, 7:30 A.M.
June 25	Intelligence Test for all new students (Saturday P.M.).
July 4	Independence Day. No classes.
July 25, 26, 27	Final Examinations, first term (at regular class hours).
July 22, 23	Physical Examinations for all new students.
July 27	First term ends, 5:30 P.M.
July 28	Second term begins, 7:30 A.M.
July 30	Intelligence Test for all new students (Saturday P.M.).
August 31, September 1, 2	Final Examinations (at regular class hours).
September 2	Summer Convocation (Commencement), 2:00 P.M.
September 2	Summer Quarter ends, 6:00 P.M.

AUTUMN QUARTER

September 26 to 30	Entrance Examinations.
September 28 to October 3	Freshman Week.
October 3	Physical Examinations for students other than Freshmen.
October 3	Latest day for registration and payment of fees without penalty. (See page 18.)
October 4	Classes begin, 8:00 A.M.
October 8	Intelligence Test for all new students other than Freshmen (Saturday A.M.).
November 11	Armistice Day. No classes after 12 M.
November 24, 25, 26	Thanksgiving Recess.
December 20, 21, 22, 23	Final Examinations.
December 23	Autumn Convocation (Commencement), 2:00 P.M.
December 23	Autumn Quarter ends, 6:00 P.M.

1933

WINTER QUARTER

January 2 to 5	Physical Examinations for all new students.
January 2	Latest day for registration and payment of fees without penalty. (See page 18.)
January 3	Classes begin, 8:00 A.M.
January 7	Intelligence Test for all new students (Saturday A.M.).
February 22	University Day. No classes.
March 17, 18, 20, 21	Final Examinations.
March 17	Winter Convocation (Commencement), 2:00 P.M.
March 21	Winter Quarter ends, 6:00 P.M.

SPRING QUARTER

March 27	Latest day for registration and payment of fees without penalty. (See page 18.)
March 28	Classes begin, 8:00 A.M.
March 28 to 31	Physical Examinations for all new students.
April 1	Intelligence Test for all new students (Saturday A.M.).
May 30	Memorial Day. No classes.
May 31	Competitive Drill. Cadet Regiments.
June 10, 12, 13, 14	Final Examinations.
June 10	Alumni Day.
June 11	Baccalaureate Sermon.
June 12	Class Day.
June 12	Spring Convocation (Commencement).
June 14	Spring Quarter ends.
June 20	Summer Quarter (1933) begins.
September 1	Summer Quarter (1933) ends.
October 3	Autumn Quarter (1933) begins.

ADMINISTRATION

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LAWRENCE E. LAYBOURNE.....Springfield
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President.....GEORGE W. RIGHTMIRE
Office: Administration Building—UN-3148; Campus 312
Residence: Ohio State University Campus—UN-3148; Campus 274

President Emeritus.....WILLIAM OXLEY THOMPSON
Residence: 55 Woodland Ave.—FA-9130

Secretary of the Board of Trustees and Business Manager.....CARL E. STEEB
Office: Administration Building—UN-3148; Campus 332
Residence: 198 W. 11th Ave.—UN-4732

Assistant to the President.....GEORGE W. ECKELBERRY
Office: Administration Building—UN-3148; Campus 380
Residence: 2023 Collingswood Rd., Upper Arlington—UN 8841-W

Registrar, University Editor, Secretary of the University Faculty, and Alumni Recorder.....EDITH D. COCKINS
Office: Administration Building—UN-3148; Campus 314
Residence: 1580 Guilford Rd., Upper Arlington—UN-9635

University Examiner.....BLAND L. STRADLEY
Office: Administration Building—UN-3148; Campus 412
Residence: Canal Winchester—Canal Winchester Ex. 71

Executive Clerk.....KATHERINE A. VOGEL
Office: Administration Building—UN-3148; Campus 312
Residence: 1040 Elmwood Ave.—UN-3653-R

Comptroller.....CHARLES A. KUNTZ
Office: Administration Building—UN-3148; Campus 332
Residence: 265 E. Tulane Rd.—LA-3606

Cashier.....FLORIS D. HANE
Office: Administration Building—UN-3148; Campus 372
Residence: 373 13th Ave.—WA-1054

Dean of Men.....JOSEPH A. PARK
Office: Administration Building—UN-3148; Campus 288
Residence: 1474 Doone Rd., Upper Arlington—UN-1559-J

Dean of Women.....ESTHER ALLEN GAW
Office: Pomerene Hall—UN-3148; Campus 480
Residence: 60 Jefferson Ave.

House Superintendent, Residence Halls.....EMMA E. PROUT
Office: Oxley Hall—UN-3148; Campus 346
Residence: Mack Hall—UN-3148; Campus 264

THE GRADUATE SCHOOL

Dean.....WILLIAM McPHERSON

Office: 106 University Hall—UN-3148; Campus 466
Residence: 198 16th Ave.—WA-1579

Assistant to Dean.....CARL WITTKE

Office: 207 University Hall—UN-3148; Campus 505
Residence: 398 W. 9th Ave.—UN-2831

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WALLACE W. CHARTERS, Ph.D., LL.D., Director, Bureau of Educational Research
DWIGHT M. DeLONG, Ph.D., Professor of Zoology and Entomology
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M. BLAKEMORE EVANS, Ph.D., Professor of German
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EMBURY A. HITCHCOCK, M.E., Director, Engineering Experiment Station
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EARL N. MANCHESTER, B.A., University Librarian
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RICHARD BRADFIELD, Ph.D., Representing the Ohio Agricultural Experiment Station
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EDGAR N. TRANSEAU, Ph.D., Professor of Botany
EUGENE VAN CLEEF, Ph.D., Professor of Geography
JAMES R. WITHROW, Ph.D., Professor of Chemical Engineering
CARL WITTKE, Ph.D., Professor of History

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EDWIN WATTS CHUBB, M.A., Litt. D., Professor of Rhetoric and English Literature, Ohio University

FELLOWS AND SCHOLARS

1931-1932

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JOHN STANLEY VALENTINE ALLEN.....Physics
FOSTER LINDSEY BROOKS.....Mathematics
ALAN THEODORE CHAPMAN.....Chemistry
TOD B. GALLOWAY DIXON.....Chemical Engineering
CRAIG WILLIAM EAGLESON.....Zoology
GILFORD JOHN IKENBERRY.....Botany
WILLIAM TIMOTHY MILLER.....History
HERBERT SHERWOOD WARWICK, II.....History
IGNATIUS JOHN WERNERT.....Chemistry

UNIVERSITY SCHOLARS

CARROLL ELY AMOS.....Physics
ARTHUR BRUCE BANKHARDT.....Chemistry
RICHARD SHERMAN CLARK.....French

EUGENE HAROLD HANSON.....Mathematics
CLINE MORGAN KOON (Summer Quarter only).....School Administration
MARJORIE LEFFLER .....Mathematics
RALPH ALDEN LORING .....Physics
LESTON LEWIS LOVE.....Practical Arts and Vocational Education
BRUCE ROBERT MORRIS.....Economics
MILDRED RATLIFF NEWLIN.....Chemistry
BEN ROSENBERG .....German
EDWARD CHRISTIAN SIMMONS .....Economics
LOIS MARIE SPROULL .....English
SOPHIA STAMBAUGH .....Latin
MYRON THOMAS STURGEON.....Geology
CLARENCE E. TAFT.....Botany
SAMUEL UNGER .....History
MARGERY K. WALKER.....Chemistry
HELEN LUCILLE WILLIAMS .....History

E. I. DUPONT DE NEMOURS & COMPANY FELLOW

WESTON ANDREW HARE .....Chemistry

ROBINSON FELLOW

ELWOOD DWAYN SHIPLEY.....Electrical Engineering

NATHANIEL WRIGHT LORD FELLOW

EARL CASSIDY KIRK.....Metallurgy

POTASH EXPORT COMPANY FELLOW

GLENN CARPENTER .....Horticulture

NATIONAL KRAUT PACKERS ASSOCIATION FELLOW

CECIL H. WADLEIGH.....Horticulture

BOILER FEEDWATER STUDIES FELLOW

SOLOMON FREDERICK WHIRL.....Chemistry

EDGAR PLASTIC KAOLIN COMPANY FELLOW

PAUL GEORGE HEROLD.....Ceramic Engineering

PAN-AMERICAN FELLOW
(The Ohio Federation of Women's Clubs)

EMA LASTENIA GONZALEZ.....Principles of Education

SMITH AGRICULTURAL CHEMICAL COMPANY FELLOW

FRANK S. CURTO.....Horticulture

ALFRED LEE LOOMIS FELLOW

PRESTON MAYNE HARRIS.....Chemistry

ENGINEERING EXPERIMENT STATION—BUREAU OF BRIDGES OF THE STATE HIGHWAY DEPARTMENT COOPERATIVE FELLOW

KARL VERNON TAYLOR.....Civil Engineering

NATIONAL RESEARCH COUNCIL FELLOW

F. BECKENBACH .....Mathematics

INTERNATIONAL RESEARCH FELLOW OF THE ROCKEFELLER FOUNDATION

S. SAKS ..... Mathematics

ENGINEERING EXPERIMENT STATION FELLOWS

CHARLES E. HALL ..... Civil Engineering
BELDEN SMITH TUCKER ..... Civil Engineering

ENGINEERING EXPERIMENT STATION—BUREAU OF STANDARDS FELLOWS

CARL H. RAPP ..... Ceramic Engineering
WALTER W. BRAUN ..... Chemistry
FRANCIS J. WILLIAMS ..... Ceramic Engineering

GENERAL EDUCATION BOARD FELLOWS

PAUL V. JEWELL ..... Physics
RICHARD S. MINOR ..... Sociology

BATTELLE MEMORIAL INSTITUTE FELLOW

HUBERT ARTHUR GROVE ..... Metallurgy

HERBERT LANG FELLOW

JEROME N. MILLER ..... Chemistry

HONORARY FELLOWS

A. W. BOSWORTH ..... Physiological Chemistry
YUN HAO FENG ..... Chemical Engineering
ROBERT CHESTER KINTNER ..... Chemical Engineering
GEORGE ZINZALIAN ..... Chemical Engineering

THE OHIO STATE UNIVERSITY

The Ohio State University is situated within the corporate limits of the city of Columbus. It is supported by appropriations from the State and Federal governments. The University land covers about 1,250 acres, 300 of which are in the campus. The total value of land, buildings, and equipment is $22,454,083.00.

ORGANIZATION

For convenience of administration the departments of the University are grouped into organizations called Colleges. The Ohio State University comprises ten Colleges and a Graduate School, each under the administration of a Dean and College Faculty, as follows:

Graduate School
College of Agriculture, including the School of Home Economics
College of Arts and Sciences
College of Commerce and Administration, including the Schools of Journalism and Social Administration
College of Dentistry
College of Education
College of Engineering, including the School of Mineral Industries
College of Law
College of Medicine, including the School of Nursing
College of Pharmacy
College of Veterinary Medicine

THE UNIVERSITY YEAR—FOUR QUARTERS

The University year is divided into four Quarters, each approximately eleven weeks in length. The Summer Quarter is further divided into two terms of approximately six weeks each. Complete courses that are so announced may be taken for either term or for the entire Quarter.

Nearly all of the elementary courses are five hours each week. A number of more advanced courses are two or three hours each week. The schedule is so arranged that a student who is registered in the Graduate School, or in a College where the work is largely elective, may enter at the beginning of any Quarter and may, without hardship, be absent during any Quarter. For the most part students will take one Quarter each year as a vacation period—usually the Summer Quarter. By attendance in all four Quarters the duration of the time of residence for a degree may be shortened. Many persons, particularly teachers, avail themselves of the advantages offered in the Summer Quarter.

This *Bulletin* is devoted to the work of the Graduate School for the Autumn, Winter, and Spring Quarters, 1932-1933. The announcements for the Summer Quarter are printed in the Summer Quarter Bulletin.

NOTE: Bulletins describing the work of the several Colleges may be obtained by addressing the University Examiner, The Ohio State University, Columbus, and stating the College in which the writer is interested. (For list of bulletins, see the last page.)

THE GRADUATE SCHOOL

GENERAL INFORMATION

The office of the Graduate School is located in Room 106, University Hall, on the west side of the Campus. The office is open from 8:00 A. M. to 12:00 M. and 1:00 to 5:00 P. M. daily, except Saturday. On Saturday, it is open from 8:00 A. M. to 12:00 M.

The offices of the President of the University, the University Examiner, the Registrar, and the Bursar are located in the Administration Building.

ORGANIZATION AND ADMINISTRATION

The instruction and training of graduate students has been one of the functions of The Ohio State University since 1878, when the first graduate student was in residence. For a number of years the graduate work of the University was unorganized and each department conducted its own work with little reference to that of other departments. After the University was divided into colleges, each college controlled the graduate work offered in the various departments constituting that college. In 1902, however, the graduate work within the College of Arts had assumed sufficient proportions to warrant the organization of a Graduate School to secure an effective and systematic arrangement of the graduate work of that college. Finally in 1911, there was organized the Graduate School of the University to administer all the graduate work offered in the several departments of the University. This School is under the administration of a Graduate Council consisting of the Dean and twenty-six members. The membership of the Council is made up of the following: the Director of the Bureau of Business Research, the Director of the Bureau of Educational Research, the Director of the Engineering Experiment Station, a representative of the Ohio Agricultural Experiment Station, the University Librarian, twenty members of the instructional staff appointed from among those departments offering graduate work in The Ohio State University, and one representative from the faculty of Ohio University. This council reports directly to the University Faculty, which is the legislative body of the Graduate School, as well as of the ten colleges.

All communications and inquiries regarding matters connected with the Graduate School, whether from prospective students or from those whose work is in progress, should be directed to the Dean of the Graduate School.

AGREEMENTS BETWEEN THE OHIO STATE UNIVERSITY AND OTHER STATE-SUPPORTED INSTITUTIONS BEARING ON GRADUATE WORK

In order that the facilities of certain institutions of the State of Ohio may be utilized for the pursuit of research work in connection with

the Graduate School of the University, certain agreements have been made between the Board of Trustees of The Ohio State University and similar boards of Ohio University and of the Ohio Agricultural Experiment Station. Briefly, these agreements are as follows:

(a) **With Ohio University.** Ohio University is represented upon the Graduate Council of The Ohio State University. It is agreed, however, that no graduate work will be offered by Ohio University except that part-time assistants connected with the instructional staff of Ohio University may pursue their graduate work for the Master's degree at Ohio University subject to the supervision of the Graduate Council of The Ohio State University, and upon the successful completion of the same will receive their degrees from The Ohio State University.

(b) **With the Ohio Agricultural Experiment Station.** Persons engaged in investigation at the Ohio Agricultural Experiment Station may register in the Graduate School of the University and the research work carried on at the Station by such persons may be counted towards a graduate degree under appropriate restrictions. All such cases, however, shall be considered individual and subject to detailed examination on the part of the Graduate Council. It is possible for a student to complete his work for the Master's degree in residence at the Station alone. For the Doctor's degree he must spend at least one year in residence at The Ohio State University. In all cases, however, the work of the student is carried on under the general rules and regulations of the Graduate Council and the final examinations must be taken at the University in the presence of representatives of the Experiment Station Staff and of the Graduate Council.

In addition to the above, agreements have been entered into by the Board of Trustees of The Ohio State University and similar boards of The Merrill-Palmer School of Detroit, Michigan, and of Ohio Wesleyan University, and the State Bureau of Juvenile Research, as follows:

(a) **With the Merrill-Palmer School.** A graduate of The Ohio State University who has completed all the necessary undergraduate requirements may fulfill the residence requirement for the Master's degree by satisfactorily completing one Quarter of acceptable work in residence at The Ohio State University, and two additional Quarters of acceptable work in residence at the Merrill-Palmer School. Before entering the Merrill-Palmer School, the candidate must confer with the Chairman of the department at The Ohio State University in which he wishes to major, under whose direction a general course of study for the Master's degree will be arranged. The thesis subject must be of such a character as to enable the candidate to carry on experimental work at the Merrill-Palmer School.

The final examinations of the candidate will be conducted by a committee consisting of members of the instructional staff of this University, together with representatives of the Merrill-Palmer School, according to the rules governing the Master's degree. The thesis must meet with the approval of both the Merrill-Palmer School and this University.

Students carrying on work at the Merrill-Palmer School under the above regulations must also register at the same time in the Graduate School of this University, but will not be required to pay fees in this University.

(b) With the Perkins Observatory of Ohio Wesleyan University. Students registered in the Graduate School of The Ohio State University who are specializing in Astronomy and Astrophysics may carry on their research work under the guidance of the Director of the Perkins Observatory. This plan applies only to students who wish to pursue research work in Astronomy or Astrophysics, the result of which is to be embodied in a dissertation for the Ph.D. degree.

The facilities of the Observatory are excellent. The principal instrument is a large reflecting telescope, the mirror for which was cast by the Bureau of Standards, and is the first large piece of optical glass made in this country. The reflecting surface measures 69 inches in diameter and offers an unusual equipment for astronomical and astrophysical research. There is an auxiliary photographic doublet of six inch aperture, and a solar objective of 25 feet focal length.

The observatory is being provided with auxiliary scientific equipment which will afford special facilities for photometric, spectroscopic and radiometric investigations.

The main building houses the offices for the staff, a lecture room, a spacious library, research laboratory, photographic dark rooms, and an instrument shop for the construction of special apparatus.

A solar program is daily maintained in connection with Mount Wilson, Yerkes, Harvard, and the Naval Observatories, and automatic radio apparatus is used in the continuous study of the correlation of solar phenomena with electric wave transmission.

Opportunities are afforded for publication of observations and results through the series of Contributions from the Perkins Observatory.

(c) With the Bureau of Juvenile Research of the State of Ohio. Students who are registered in the Graduate School of The Ohio State University and who are candidates for a Master's degree, specializing in Clinical Psychology, may do not to exceed one-third of the work required for this degree at the Bureau of Juvenile Research. All such work must be approved in advance by a professional member of the Clinical Division of the Department of Psychology, and all credits received for such work must be submitted under his signature.

Candidates for the degree of Doctor of Philosophy specializing in Clinical Psychology, may likewise carry on work at the Bureau of Juvenile Research. The amount of such work shall be determined in each individual case by a professional member of the Division of Clinical Psychology of the Department of Psychology and the Dean of the Graduate School, but in no case will this amount exceed one-third of the total requirements for the degree of Doctor of Philosophy.

Students carrying work at the Bureau of Juvenile Research must be registered in the Graduate School of this University during the time in which they are pursuing such work.

THE UNIVERSITY LIBRARY

The University Library consists of all books owned by the University and numbers approximately 385,700 volumes. The main part of the Library, which is known as the General Library, is housed in the Library Building. Very important divisions of the book collection are housed in other buildings. A catalog of the entire collection is maintained in the General Library.

Any person is privileged to use the University Library for reference, but books may be drawn only by officers and registered students of the University.

The General Library is open, during the Autumn, Winter, and Spring Quarters, from 8:00 A. M. to 10:00 P. M., Monday to Friday; Saturday from 8:00 A. M. to 5:30 P. M. During the Summer Quarter, hours are from 7:30 A. M. to 10:00 P. M., Saturday from 7:30 A. M. to 5:30 P. M. Vacation hours are from 8:00 A. M. to 5:00 P. M., Monday to Friday; Saturday from 8:00 A. M. to 12:00 M. During the Autumn, Winter, and Spring Quarters, the Library is open on Sunday from 2:00 to 6:00 P. M. The Library is closed on legal holidays.

The University Library is a depository for the official publications of the United States and has a very complete collection of these documents. It also receives thousands of documents from states, cities, and foreign countries. The Library also possesses the British Parliamentary Papers including the rare early volumes. The numerous series of the publications of the League of Nations are well represented in the Library Collections. The exchanges of the Ohio Academy of Science, of the Ohio State University Scientific Association and of the Ohio Biological Survey are deposited in the University Library.

The University Library is a depository for the Library of Congress catalog.

Eleven department libraries, organized divisions of the University Library, are in charge of library assistants.

The Botany and Zoology Library is located in the Botany and Zoology Building. The "Index to General Botanical Literature," the "Index to Algological Literature" and the card index to the Concilium Bibliographicum are in this departmental library.

Brown Hall Library, located in Brown Hall, contains collections of books on Architecture, Engineering Drawing, and Civil Engineering. The collection of plates filed in this library is especially valuable for students in Architecture.

The Charles Cutler Sharp Library is located in the Chemistry Building. It contains not only the current periodicals and a large collection of dictionaries and handbooks on chemistry, but also complete sets of all important journals dealing with subjects lying within the general field of chemistry and related sciences.

The Commerce Library, in the Commerce Building, includes a working collection of books for the undergraduate students in the College of Commerce. A large study room is maintained and also a reserve collection for student use.

The Education Library is located in the Education Building. It is organized for graduate work and includes complete sets of important educational and psychological periodicals, city and state reports, text-books, and other works of reference on educational and psychological subjects.

The Law Library is in Page Hall. It includes all of the United States and state reports, the English reports, the Irish reports, the latest statutes, codes and session laws of the states, complete sets of all the important legal periodicals and an up-to-date collection of text-books. It is especially well equipped for the study of Ohio law.

The Lord Hall Library consists of collections of books on Ceramics, Mining, Metallurgy, and Mineralogy and is located in Lord Hall.

The Medical and Dental Library is in Hamilton Hall. It consists of a working collection of books and periodicals. The historical books and many of the foreign periodical sets are shelved in the General Library.

The Orton Memorial Library, located in Orton Hall, is one of the finest geological libraries in the country. In addition, the Ohio Geological Survey deposits its document exchanges with the library. These two collections constitute a very complete set of official geological reports from the states, foreign governments, and scientific societies.

The Pharmacy-Bacteriology Library is located on the first floor of the new Pharmacy and Bacteriology Building. It comprises files of journals and selected titles in pharmacy and bacteriology designed to furnish a reference collection for the students in these departments.

The Alfred D. Cole Memorial Library of Physics occupies two rooms in the Mendenhall Laboratory of Physics. The nucleus of the collection is the private library of Professor Cole, supplemented by files of journals and selected titles in the field of physics, transferred to this collection from the General Library. A memorial endowment fund contributed by friends of Professor Cole will ultimately provide for additions to this Library. The books and journals in the field of mathematics are shelved at present in the Cole Memorial Library rooms for the mutual convenience of the two departments.

Smaller collections selected with special reference to the needs of the various departments are housed near their offices. Collections of this type have been developed for Political Science, Room 100, University Hall, Veterinary Medicine in the Veterinary Laboratory, Journalism on the second floor of the Journalism Building, Agriculture in Room 309, Main Library. The books relating to the Department of Fine Arts are collected in the Mantel Room in the General Library, where students have every facility for research.

The Library of the Ohio Archaeological and Historical Society, which is on the University Campus, is at the service of the officers and students of the University. This library is specializing in the history of Ohio and the Northwest and a very valuable collection is being built up. Its

large newspaper collection is one of the most valuable in the Middle West.

The special library of Battelle Memorial Institute and the collections of the State Library are open to faculty and students of the University and supplement in important fields the collections of the University Libraries.

THE STATE LIBRARY

The State Library, consisting of approximately 300,000 volumes, is also available and is especially valuable in certain lines of work.

TEACHERS PLACEMENT SERVICE

The Ohio State University maintains a Teachers Placement Service for the convenience of the Superintendents and Boards of Education of the State. Graduates and graduate students of the University are invited to enroll with the Appointment Office.

The Placement Service is under the direction of the Bureau of Educational Research. This service is rendered free of charge to the applicants. Graduates of experience who desire to better their locations are invited to communicate with the Appointment Office.

The Appointment Office has available such statistical information that advice and direction may be given in the matter of supply and demand for teachers in their various fields.

The service offered will be rendered on the exact basis of merit.

Superintendents and Boards of Education are invited to state their needs to the Appointment Office. Prompt attention to all calls is assured.

STUDENT MEDICAL SERVICE

Medical Staff: Dr. James S. Wilson, Director; Dr. M. F. Osborn, Dr. John W. Wilce, Dr. J. M. Foley, Dr. James A. Beer, Dr. Shirley Armstrong, Dr. Charlotte Winnemore.

Office Hours. When the University is in session, daily 8:30 to 12:00 and 1:00 to 4:30; Saturday, 8:30 to 12:00. Phone: Campus 461.

The object of the Student Medical Service is to render first aid and casual treatment to students on the campus. It also plans to conduct periodic health examinations for those who desire them.

Free Treatment. Consultation at the hours indicated above is free to any student. Two days hospital observation at the University Hospital is also free for those students who, in the judgment of the Student Medical Service, are in need of hospital service. Students requiring more than first aid or casual treatment will be referred to competent medical practitioners unless unable to pay for such services.

It may develop that students undergoing treatment at the Student Medical Service Office on the Campus will need the services of a competent specialist. This will be arranged by the Student Medical Service on request of the student. The specialist is to be paid by the student.

Treatment off the Campus. For students who have recently entered the University the following information is offered: In case of illness off the campus, students desiring the services of a physician will call UN-5842, the Physicians and Surgeons Bureau, who on receipt of the call will arrange for the services of a competent physician to attend the case. The student requesting the call will pay the attending physician.

Periodic Health Examination. It is proposed to offer to the Seniors for the present academic year the privilege of undergoing a health examination. The examination is to be conducted along the lines approved by the American Medical Association and will be made without cost to the student. Such an examination is of the utmost importance for the purpose of removing a present disability or forestalling one that may occur in the future. In young adults, physical defects which may be readily overcome often progress and become in later years a serious handicap that cannot be corrected. The student who graduates ought to be a distinct asset to the State. It is for this purpose that the "Periodic Health Examination" has been inaugurated.

Emergency Service on the Campus. During office hours, in the event of an emergency or accident of such a nature that the patient is unable to come to the Student Medical Service Office, call Campus 461. A physician will immediately respond to the call. Immediate ambulance service for students can be secured by calling the campus telephone operator (Dial 0) and giving the exact location where the ambulance is needed.

STUDENT AUTOMOBILES

The University does not bar the use of automobiles by students. However, students can be given only very limited parking space on the campus, and the use of autos is discouraged. Unless the student drives a long distance to and from his home each day or is physically incapacitated, he does not need a car while attending the University. The cooperation of parents in this matter is earnestly desired.

FEES AND EXPENSES

All University fees must be paid at the opening of the Quarter as a condition of admission to classes. Registration is not complete and admission to classes will not be approved until all fees have been paid. A fee card should be secured in the office of the Registrar and the fees paid in the office of the Bursar. All fees must be paid by the close of the day preceding the first day of recitations. A penalty of $5.00 for each succeeding day or fraction thereof will be assessed for failure to comply with this rule except in the case of a graduate student or a new student granted late registration by the Executive Committee of his college. A student granted late registration must pay his fees within twenty-four hours of the date assigned for his registration or the penalty will be imposed. A fee of $1.00 will be charged for each duplicate receipt for fees.

Registration is not complete until all fees have been paid. No student will have any privileges in the classes or laboratories until all fees and deposits are paid.

Since all fees are due and payable as a part of the student's registration, no person should come to the University for registration without money sufficient to cover all of his fees and deposits.

1. Matriculation fee (non-returnable)
   Required of every student on *first admission to the University* $10.00

2. Incidental fees
   Incidental fees do not vary with the number of courses taken
   Quarter fee for a resident of Ohio..... 20.00
   *Quarter fee for a non-resident of Ohio..... 70.00

3. Special fees
   (a) Ohio Union (Men) (Each Quarter)..... 1.00
   Women's Union (Women) (Each Quarter)..... 1.00
   The Union fees entitle the students to all the privileges of the Unions
   (b) Student Activities and Medical Service fee..... 1.00
   Required of all students each Quarter; to be used in support of Student Government Activities and the Student Medical Service
   (c) Laboratory Breakage deposit — Amount varies with course .....from 1.00 to 20.00

   Students are required to pay for all materials consumed in laboratory work. The laboratory deposit must be made at the time of registration before the student may enter the laboratory. All laboratory sup-

* Non-resident fee. See page 19.

plies are sold to students at the Laboratory Supply Store, Chemistry Building, and charged against the deposits (See page 20). Instructors shall not permit students to engage in laboratory work unless the student has shown a receipt from the Bursar for deposit paid

(d) Graduation fee

A graduation fee is required of each person receiving a diploma. The fee must be paid one week before the close of the Quarter in which the candidate expects to receive his degree

Bachelor's degree	5.00
Master's degree	10.00
Doctor's degree (Ph.D.)	10.00

(e) Abstract fees

The abstracts of Masters' theses and Ph.D. dissertations are published in the form of a journal at the end of each Quarter and a special fee for editing, printing, and binding these abstracts is required for each person receiving such a degree from this University. This fee must be paid not later than five days *before* the Commencement date on which the candidate expects to receive his degree

Abstracts of Masters' theses	5.00
Abstracts of Ph.D. dissertations	50.00

NON-RESIDENT FEE

Every student who is not a legal resident of the State of Ohio is required to pay a non-resident fee of $50.00 each Quarter (or $25.00 each term of the Summer Quarter) of his residence in the University in addition to other University fees. The burden of registering under proper residence is placed upon the student. If there is any possible question of his right to legal residence the matter should be brought to the attention of the Registrar and passed upon, previous to registration or the payment of fees. Any student who registers improperly under this rule shall be required to pay not only the non-resident fee but shall be assessed a penalty of $10.00. Students who do not pay this fee within thirty days after they have been notified that the non-resident fee has been assessed against them, will have their registration in the University cancelled.

No person shall be considered eligible to register in the University as a resident of the State of Ohio unless he has been a *bona fide* resident in the State twelve consecutive months next preceding the date of his original enrollment, and no person shall be considered to have gained or lost a residence in this State for the purpose of registering in the University by any conduct of his own while he is a student in the University; but persons whose legal residence follows that of other persons, as hereinafter provided, shall be considered to have gained or lost legal

residence in this State for such purpose while students in the University according to changes of legal residence of such other persons, except that such legal residence shall not be considered to be so gained until twelve months after such other person becomes a legal resident of this State.

MINORS: The residence of minors shall follow that of the legal guardian, regardless of emancipation; but in case a resident of Ohio is appointed guardian of a non-resident minor, the legal residence of such minor for the purpose of this rule shall not be considered to be established in the State of Ohio until the expiration of twelve months after such appointment.

WIVES: The residence of wives shall follow that of husbands.

ALIENS: Aliens who have taken out their first citizenship papers and who have been residents of Ohio for twelve months next preceding the date of their enrollment in the University, shall be regarded as eligible for registration as residents of Ohio.

ROOM AND BOARD

Room and Board. (See Living Arrangements, page 26.)

REFUND ON FEES

Fees are not returnable except in case of sickness and for causes entirely beyond the control of the student. No part of the fees shall be returned for voluntary withdrawal of the student or enforced withdrawal thirty days after the registration. Students withdrawing under discipline forfeit all rights to the return of any part of the fees. No fees will be returned in case of withdrawal of students until thirty days have elapsed from the date of withdrawal.

On Tuition Fees. To be entitled to a return of fees, the student must withdraw during the first thirty days of the Quarter and must present the permission to withdraw, given by the Dean, to the Bursar within this thirty-day period. Unless the case is entirely exceptional, no more than one-half of the fee paid will be refunded.

On Laboratory Deposits. If a student is forced to withdraw from a laboratory course during a Quarter, he must first secure permission from his Dean.

No portion of a laboratory deposit of $5.00 or less shall be returned, unless the course is officially dropped by the student within thirty days after the payment of the deposit.

On a laboratory deposit of $6.00 or more the unexpended part of the deposit is returnable if called for on or before the close of the Spring Quarter of the fiscal year in which the deposit has been made.

An order for refund for the unexpended portion of the deposit may be obtained by applying at the Laboratory Supply Store, Chemistry Building. The unexpended part of the deposit will be paid at the Bursar's Office on presentation of the order for refund.

SPECIAL FEES—PENALTIES

PENALTY FOR FAILURE TO KEEP APPOINTMENT FOR PHYSICAL EXAMINATION

A fee of $1.00 will be assessed for failure to keep appointment for Physical Examination or for change in date of Physical Examination.

PENALTY FOR RE-REGISTRATION

When checks given for payment of fees are not paid on presentation at bank, registration will be cancelled and receipts given considered null and void. A penalty of $5.00 will be assessed for re-registration.

ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

GRADUATE ASSISTANTSHIPS

OPEN TO GRADUATE STUDENTS

In order to encourage graduates of this University and of other similar and approved institutions, especially those in Ohio, to continue their studies and to pursue advanced work leading to the higher degrees, the University has established graduate assistantships in several departments. Graduate assistants are elected for the year—four Quarters. During three Quarters, generally the Autumn, Winter, and Spring Quarters, they must devote approximately one-third of their time to assisting in the work of the department in which they are specializing; during the remaining Quarter the graduate assistants are free to carry on their work at the University or elsewhere. Each graduate assistant must confer with the chairman of the department in which he is specializing concerning the Quarters that he must be in residence. A graduate assistant receives a stipend of $500, payable in nine monthly installments during the three Quarters in which he is rendering service. In addition, all fees are remitted except a matriculation fee of $10.00 in case the assistant has never attended the University. If a graduate degree is obtained, he must also pay a diploma fee of $10.00 as well as a fee for printing the abstract of his thesis or dissertation ($5.00 in the case of the Master's degree and $50.00 in the case of the degree of Doctor of Philosophy).

Students desiring to apply for graduate assistantships in any academic year *must present their applications not later than March 1 of the preceding year.* Application blanks may be obtained upon request by addressing the chairman of the department in which the candidate desires to secure such an assistantship.

UNIVERSITY SCHOLARSHIPS AND FELLOWSHIPS

In addition to the graduate assistantships, a limited number of scholarships and fellowships have also been established. The scholarships are open to students having a baccalaureate degree from an approved institution, and have a value of $300 with exemption from all fees, except the matriculation fee of $10.00. The fellowships, on the other hand, are open only to students who have at least the Master's degree or its equivalent, and have a value of $500 with like exemption from all fees, except the matriculation fee. If a graduate degree is obtained, a scholar or a fellow must pay a diploma fee of $10.00, as well as a fee for printing the abstract of his thesis or dissertation ($5.00

in the case of the Master's degree and $50.00 in case of the degree of Doctor of Philosophy).

Scholars and fellows are selected on a basis of merit, irrespective of the departments in which they wish to work, and must devote all their time to graduate work, including research. They are elected for the year, four Quarters, but are required to be in attendance only three Quarters, generally the Autumn, Winter, and Spring Quarters, during the year. Candidates for these positions must file their applications not later than March 1. Application blanks may be obtained by addressing the Dean of the Graduate School. Appointments are made annually on April 1 in accordance with the regulations of the Association of American Universities, of which Association the University is a member.

SPECIAL FELLOWSHIPS

THE STILLMAN W. ROBINSON FELLOWSHIP

The fellowship endowed by Stillman W. Robinson, late Professor of Mechanical Engineering, for the encouragement of graduate research in engineering, has an annual value of $750, and is open to graduates in Mechanical, Civil, and Electrical Engineering.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the Master's or the Doctor's degree under the general regulations which obtain in reference to these degrees. For further information, or for application blanks, address the Dean of the Graduate School or the Secretary of the College of Engineering.

All applications should be filed with the Dean of the Graduate School not later than March 1.

THE NATHANIEL WRIGHT LORD FELLOWSHIP

The fellowship endowed by William Bartlett Calkins, an alumnus of the University, in memory of Nathaniel Wright Lord, late Professor of Metallurgy, has an annual value of $750. This fellowship was established to encourage graduate research on solid fuels or products derived from solid fuels which have a practical application in the industrial world.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the degree of Master of Science or Doctor of Philosophy, under the general regulations which obtain in reference to these degrees. For further information or for application blanks address the Dean of the Graduate School.

All applications should be filed with the Dean of the Graduate School not later than March 1.

THE E. I. duPONT de NEMOURS FELLOWSHIP

Through the generosity of E. I. duPont de Nemours & Company of Wilmington, Delaware, and in recognition of the services of colleges and universities in training chemists for the emergency of the War, fellowships in chemistry have been established in a number of institutions, one of which is available at The Ohio State University.

The holder of the fellowship must be prepared to engage at once in active research upon a problem distinctly chemical in character, there being no further limitations upon the fellowship. The stipend is $750 per annum, and it is expected that at the conclusion of the period the holder of the fellowship will be able to present his research as a dissertation for the degree of Doctor of Philosophy. For further information, or for application blanks, address the Dean of the Graduate School.

All applications must be filed with the Dean of the Graduate School not later than March 1.

THE BATTELLE MEMORIAL INSTITUTE FELLOWSHIPS

The Battelle Memorial Institute of Columbus has established one or more fellowships at The Ohio State University. Each fellowship carries an honorarium of $60.00 per month for ten months, September to June inclusive. All course work selected by the fellow will be taken at The Ohio State University, while the research work will be carried on at The Battelle Memorial Institute. Inasmuch as this institute was founded for the purpose of studying the application of science to industries, especially in Metallurgy, Fuels and allied fields, the candidate's research work must be in this general field. Ordinarily each fellow will be a candidate either for the degree of Master of Science or Doctor of Philosophy, and will devote his entire time to graduate work, including research.

Candidates may secure application blanks by addressing the Dean of the Graduate School. All applications should be received not later than March 1 of each academic year.

ENGINEERING EXPERIMENT STATION FELLOWSHIPS

Engineering Experiment Station-United States Bureau of Standards Ceramic Research

In cooperation with the United States Bureau of Standards, The Ohio State University offers three fellowships in the Engineering Experiment Station. The stipend is $750 for a period of nine months, starting October 1. These fellowships are open to college graduates who have had sufficient training in ceramics, metallurgy, or chemistry to carry on the particular research assigned. The completed research shall constitute the thesis required for the postgraduate degree. The holders of these fellowships may be permitted to carry a maximum of fifteen total credit hours in University courses during the year, provided not more than six hours of these courses carry laboratory.

Applicants should apply to the Director of the Engineering Experiment Station, or to the Superintendent of the Ceramic Station, U. S. Bureau of Standards, both of The Ohio State University.

OTHER STATION FELLOWSHIPS

Additional fellowships in the Engineering Experiment Station are maintained entirely by the Station. The number of such fellowships varies from year to year, depending on the availability of funds for the Station projects.

Other fellowships in the Station may be financed by cooperating industries.

Station and Industrial fellowships may be established for work in any of the engineering departments. The usual stipend is $750 per year, sometimes more in the case of industrial fellowships.

HONORARY FELLOWSHIPS

Persons who have already received their Doctor's degree and wish to carry on research work may be appointed Honorary Fellows. Honorary Fellowships carry no honorarium but persons holding these fellowships are given the complete freedom of the University and are exempt from the payment of all fees, but will be required to pay the cost of any materials consumed in the pursuit of their research.

OTHER FELLOWSHIPS

From year to year there are a number of special fellowships that are open to students who have the training to fill these positions. Some idea can be gained concerning these fellowships from the following list of fellowships which have been filled in the present year:

3 Bureau of Standards-Engineering Experiment Station, Cooperative Fellowships in Ceramic Engineering and Chemistry;
2 Engineering Experiment Station Fellowships in Civil Engineering;
1 Barrett Manufacturing Company Fellowship in Soils;
1 Ohio Federation of Women's Clubs (Pan-American) Fellowship in Principles of Education;
1 National Kraut Packers Association Fellowship in Horticulture;
1 Potash Export Company Fellowship in Horticulture;
1 Boiler Feedwater Studies Fellowship in Chemistry;
2 General Education Board Fellowships in Physics and Sociology;
1 Edgar Plastic Kaolin Company Fellowship in Ceramic Engineering;
1 Smith Agricultural Chemical Company Fellowship in Horticulture;
1 Rockefeller International Research Fellow in Mathematics;
1 National Research Council Fellow in Mathematics;
1 Battelle Memorial Institute Research Fellow in Metallurgy;
1 Herbert Lang Fellow in Chemistry.

LIVING ARRANGEMENTS

The President of the University has the authority to supervise living arrangements of students not residents of the city of Columbus and to order the immediate withdrawal of any student from any boarding or lodging house in which the surroundings are undesirable.

ROOMS AND BOARD FOR MEN

The University does not possess any dormitory facilities for men. Furnished rooms can be obtained at prices varying from $10.00 to $15.00 a month, and the cost of the table board in the clubs and restaurants near the University is from $5.00 to $7.00 a week. Board can be secured at the Ohio Union at reasonable prices.

Board with furnished rooms can be obtained in private families within a convenient distance from the University at rates varying around $10.00 a week. Central Branch of the Y.M.C.A., 40 West Long Street, has rooms available for men. Rates are $2.75 a week and up, which include full club privileges of the building.

MEN'S HOUSING BUREAU

The absence of dormitories for men at Ohio State University causes the men students to reside in private rooming houses in the University district. In order to assist the students (especially those entering for the first time) in finding desirable rooms at the greatest saving, the University has created the Men's Housing Bureau, located in the office of the Dean of Men, first floor, Administration Building.

Classified lists of rooms available for every student and for any number of students are always available at this office. Boarding houses are likewise listed.

If the student signs the "Rooming House Agreement" he shall be expected to be responsible for the rental price of the room as specified in the agreement, unless he can present satisfactory reasons to the Men's Housing Bureau for moving out before the expiration of that period, or, unless he can secure a satisfactory substitute. If he moves out before the expiration of the Quarter without presenting a satisfactory excuse he shall forfeit one month's rent. The signing of such agreement is optional.

The University warns students not to rent rooms which have not been placed on the approved list by the Men's Housing Bureau. Anyone renting a room which is not on the approved list does so at his own risk.

WOMEN STUDENTS

The Ohio State University is open to women upon the same terms as obtain for men.

LIVING ARRANGEMENTS FOR WOMEN

All living arrangements for women are under the supervision of the Dean of Women. Applications for residence in the residence halls and private rooming houses should be made directly to the Dean of Women. A limited number of graduate women can be accommodated in these types of residence.

RESIDENCE HALLS FOR WOMEN

The University has three modern Residence Halls under its jurisdiction, Oxley, Mack, and Neil Halls. All three Halls are governed by student government with the advice and supervision of the House Superintendent.

Oxley Hall is located at the southwest corner of the campus on Neil Avenue. It has three floors and accommodates seventy-seven students. Each room has hot and cold running water. There are bath rooms on each floor with three tubs and two showers. The rooms are single, double, or in suites of three rooms, this arrangement prevailing on each floor. There is also a study room, parlors, music room, sun parlor, dining room, and laundry. The laundry is open to students every day except Sunday and Monday.

The rates for board and room per Quarter vary according to the room chosen, $122.00 for single rooms, $116.00 and $118.00 for double rooms, $110.00 for middle rooms in suites.

Mack Hall was opened October 1, 1923. It is joined to the south side of Oxley Hall by a cloister and accommodates one hundred girls. It contains four floors with hot and cold running water in each room. There are bath rooms on each floor with two tubs and two showers. The rooms are single, double, double suites, or single suites. There are parlors, study halls, dining room, and guest dining room. A kitchenette is located on each of three floors.

The rates for board and room per Quarter vary according to the room chosen, single rooms and single rooms in suite $122.00, double rooms and double rooms in suite $116.00 to $118.00, large rooms for three $110.00.

Neil Hall, under the University management since September 1, 1928, is situated in the block just south of the campus, between Tenth and Eleventh Avenues, on Neil Avenue. It contains four floors, with a similar arrangement of rooms on all floors—double rooms with connecting bath and a few single and double rooms without bath. The Hall accommodates two hundred and seventy girls. There is a large lounge, a large reception room, small parlors, and dining room. Each floor is equipped with a kitchenette.

The rates for board and room per Quarter vary according to the room chosen, double rooms with connecting bath $138.00 to $145.00, double room with bath $150.00, single room without bath $128.00, and double room without bath $125.00.

PRIVATE ROOMING HOUSES

Westminster Hall, 52 Fifteenth Avenue, under the supervision of the Presbyterian Church, and St. Hilda's Hall, 169 West Eleventh Avenue, under the supervision of the Episcopal Church, are open as places of residence to women students. There are also about twenty-five privately owned rooming houses under the supervision of the Dean of Women. See "Contracts and Change of Residence," below.

When meals are offered, resident students are required to have their meals in the house. A number of the privately owned rooming houses offer kitchen privileges to students who wish to prepare their own meals.

Applications for residence in the halls and houses should be made directly to the Dean of Women.

OTHER ARRANGEMENTS

A list of light housekeeping rooms and apartments is available to graduate women in the office of the Dean of Women. A list of rooms in private homes is also available. Graduate women are not permitted to live in any house where men students live.

CONTRACTS AND CHANGE OF RESIDENCE

A yearly contract is required of all those living in University operated dormitories, in privately operated dormitories, and in houses on the approved list. This contract is to be signed in duplicate, one copy being retained by the Dean of Women and the other by the Head Resident (or the Superintendent). Students are expected to stay in one place during the whole academic year or the portion thereof remaining after residence is established.

THE HEALTH OF WOMEN STUDENTS

It is the purpose of the University to safeguard and promote the health of students in every reasonable way. The Physical Examinations required of all entering women and Sophomore women are used in advising the students as to defects which need treatment or correction, as to the type of Physical Education work adapted to the needs of each student; and, in special cases, as to the academic load and outside work. Students needing special attention are watched through the year by the Medical Advisers. For advice pertaining to participation in Physical Education activities, the Medical Advisers hold daily office hours in Pomerene Hall. Students wishing medical advice or treatment should report to the Student Medical Service, Hayes Hall, where they may consult the women physicians.

The Department of Physical Education offers to University women opportunities for the development of habits which should aid them in the preservation of sound health and physical fitness. Through the acquirement of health habits the individual is enabled to establish a high standard of efficiency while in the University and to build a foundation which should influence her life after leaving the University.

ADMISSION

METHOD OF ADMISSION

The admission of students is in charge of the University Entrance Board, which determines the credits that shall be issued on all entrance examinations and certificates, and furnishes all desired information to applicants. Correspondence relating to admission should be addressed to the University Examiner, The Ohio State University, Columbus.

REQUIREMENTS FOR ADMISSION

Admission to the Graduate School is open to all graduates of The Ohio State University as well as to the graduates of all other colleges and universities of approved standing, provided their undergraduate records are satisfactory. Before entering upon graduate work in any department, the applicant must present evidence to the effect that he has had the necessary prerequisite training that will enable him to pursue with profit the courses desired. *It must be remembered also that admission to the Graduate School does not imply admission to candidacy for the degree.* No graduate student, not even one who is a graduate of The Ohio State University, is admitted to candidacy for a degree until he has been in residence a sufficient time to enable his instructors to judge of his ability to carry on graduate work.

Information concerning admission to candidacy will be found under the heading "Admission to Candidacy for a Degree."

A graduate of a college not on the approved list may be admitted to the Graduate School, provided that his college course, when checked by the University Examiner, entitles him to a credit of not less than one hundred and thirty-five Quarter-credit hours, or ninety semester hours. In all such cases, however, the residence requirement for the graduate degree will be correspondingly increased.

METHOD OF PROCEDURE FOR ADMISSION

An applicant for admission to the Graduate School must first secure a statement from the registrar or other officer of the university or college of which he is a graduate, which contains the following information: (1) the date of graduation of the applicant; (2) the degree received; (3) a complete list of courses taken and grades received. This transcript, together with a catalog of the institution of which the applicant is a graduate, should be sent to the University Entrance Board not less than three weeks (an earlier date is preferable) before the opening of the Quarter in which the applicant expects to register. If the credentials are satisfactory, an admission card to the Graduate School will be mailed promptly to the applicant. If the credentials are not satisfactory or if further information is desired, the applicant will be notified at once by correspondence.

In case the applicant finds it impossible to send by mail the statement referred to in the preceding paragraph, he may present it in person when he reports for registration and receive his admission card. However, the Entrance Board is always crowded on the opening days of the Quarters, so that the applicant will find it greatly to his advantage to secure his admission card in advance by correspondence.

METHOD OF PROCEDURE FOR REGISTRATION

The method of procedure for registration is as follows: The candidate, having secured from the University Entrance Board his admission card to the Graduate School, will present this card to the office of the Graduate School in Room 106, University Hall. A member of the staff of the department in which the candidate wishes to take his major work will then be appointed as the student's adviser. The candidate will also receive an election card which he will then take to his adviser who will assist him in mapping out and entering upon the election card a suitable course of study, and will sign the card in the appropriate place, thus indicating his approval of the course so selected. While it is advisable to map out, tentatively at least, all the work for the degree in question, nevertheless it is sometimes impossible to do this and only the work proposed for the year or for the Quarter is entered. The work for the degree, or for the year or Quarter, having been entered upon the election card, the candidate will then return the card to the office of the Graduate School and will receive his schedule card.

After receiving his schedule card, the student will immediately report to the Registrar's Office in the Administration Building and obtain his fee card. He will then pay his fees at the Office of the Bursar in the Administration Building. Registration is not complete until the payment of the fees. Even a student who for any reason is exempt from the payment of fees must report to the Bursar's Office and have his fee card stamped. All fees and laboratory deposits required of a student must be paid to the Bursar before the student is entitled to enter his classes.

CHANGES IN COURSE

After a student's election card has been made out for the year, or Quarter, changes in his course of study will be made only upon the written request of the student's adviser, and the statement embodying the reasons for such changes must be left on file with the Dean of the Graduate School. No credit will be given on the University records for courses taken without the proper authorization.

DATE OF REGISTRATION

Registration for any Quarter is permissible at any time during the two-weeks period previous to the opening day of the Quarter. If at all possible, a student should register some time during this period. For those who find it impossible to register before the opening day of the Quarter, registration is also allowed without penalty during the first week of the Quarter. In exceptional cases registration for a limited

amount of work is also permitted during the second week of the Quarter, provided the student first obtains the written permission of the instructors under whom he wishes to pursue work. Any student desiring to pursue research work only, may be permitted to register at any time during the Quarter, provided he first obtains the written permission of the instructor in charge of the work. However, any student who registers after the end of the *first week* of the Quarter will not be permitted to carry a full schedule.

A student who is exempt from the payment of fees under the regulations of the Board of Trustees must complete his registration within the first two weeks of the Quarter in order to obtain such exemption.

STUDENTS TRANSFERRING TO A COLLEGE IN THE UNIVERSITY

A student who desires to transfer from the Graduate School to a college of this University must make his application for such transfer to the University Examiner. This transfer must be approved by the University Examiner before the student will be permitted to proceed with his registration in the college which he is proposing to enter.

WITHDRAWAL FROM THE UNIVERSITY

A student who desires to withdraw from the University must apply to the Dean of the Graduate School for permission to withdraw in good standing. *If the student leaves the University at any time during the Quarter, without communicating with the Dean, he will be marked as having failed in all of his courses for the Quarter.* If a personal interview is impossible, the Dean must be notified by mail. In order to retain his right to voluntary return, the reasons given for withdrawal must be satisfactory to the Dean, and must be so endorsed at the time the application is filed.

The written permission of the Dean shall be filed with the Registrar at once by the Secretary that the proper entry may be made upon the University records.

CREDIT TOWARDS A MASTER'S DEGREE FOR COURSES REQUIRED FOR THE PROFESSIONAL DEGREES IN THE COLLEGE OF DENTISTRY AND IN THE COLLEGE OF MEDICINE

Students admitted by the University Examiner to both the Graduate School and either the College of Dentistry or the College of Medicine, may offer towards the Master's degree not to exceed 15 Quarter hours of work required for either the degree of D.D.S. or M.D. In order to obtain this privilege the candidate for the Master's degree must first secure a course card at the office of the Graduate School and present the same to the Chairman of the Department in either the College of Dentistry or the College of Medicine, in which he wishes to major. The Chairman, after consultation with the candidate, will map out the course proposed for the Master's degree which may include a maximum of 15 Quarter hours of work referred to above, and sign the card, thus indicating his approval

of the course. The candidate will then return the card to the office of the Graduate School. If the course so selected meets with the approval of the Dean of the Graduate School, the candidate will be registered in the Graduate School as well as in the appropriate professional college.

No credit will be given towards a Master's degree for the professional work referred to above unless a grade of at least "B" is obtained in the major subject.

DEGREES CONFERRED

The following higher degrees are conferred by the University: Master of Arts, Master of Science, Master of Arts in Social Administration, Master of Science in Public Administration, Doctor of Philosophy. The requirements for the Master's degree will be found on pages 34-39 and for the degree of Doctor of Philosophy on pages 39-42. All candidates must read these requirements carefully.

GRADUATE STUDENTS NOT CANDIDATES FOR A DEGREE

Graduate students who are not candidates for a higher degree are designated as "Special Students" and are not required to name a field of specialization, but may elect their work with a view to the special purpose for which they are in attendance at the University. Any course of study announced for advanced undergraduates and graduates is open for election by such students upon the same conditions that are imposed upon those who are candidates for degrees.

Should a graduate student who has not arranged his work with a view to obtaining a degree, subsequently desire to become a candidate for a degree, the amount of credit he is to receive for work already done will be determined at the time he applies for admission to candidacy for the degree.

REGISTRATION DURING THE QUARTER IN WHICH THE DEGREE IS SOUGHT

A candidate for any graduate degree must be registered in the Graduate School during the Quarter in which he expects to come up for the degree. Under exceptional conditions this requirement may be waived by the Graduate Council.

GRADING SYSTEM FOR GRADUATE STUDENTS

The work of all graduate students performed in connection with the development of theses and dissertations is reported simply as "Prog" indicating progress. All other work is reported as "A" Excellent, "B" Good, "C" Average, "D" Poor, "E" Failed. In order to receive graduate credit, a student must receive a grade of either "A" or "B" in not less than two-thirds of his work. No grade lower than "C" is counted.

Occasionally, for various reasons, a graduate student may receive a grade of "Incomplete" in a course with the privilege of finishing the work later on. In all such cases, however, this "Incomplete" must be

made up within a period of twelve months after the close of the Quarter in which the "Incomplete" was received, or no credit will be allowed for the course.

All graduate students registered in "600" courses shall be required to complete a certain amount of work in addition to that required of undergraduates. This may consist of reading additional books on the subject, the presentation of reports, or of such other work as the instructor in charge of the course may deem wise.

TOTAL CREDIT THAT MAY BE RECEIVED IN ANY ONE QUARTER

A graduate degree stands for concentration in a limited field of study. While a candidate for a degree may carry courses in excess of fifteen Quarter hours, nevertheless, *the maximum credit towards a graduate degree that may be obtained in any one Quarter is fifteen hours.*

CREDIT HOURS FOR INSTRUCTORS

The number of credit hours that may be taken by any graduate student who is not devoting his full time to the work (such as graduate assistants, part-time assistants, teachers in various schools and colleges, etc.) will be decided in each individual case by the Dean of the Graduate School and the student's adviser.

SENIORS TAKING COURSES FOR GRADUATE CREDIT

A Senior whose full time is not required for the completion of work for his baccalaureate degree may select certain courses for graduate credit, *but in order to do this the permission of the Graduate Council must be obtained before registering for the courses.*

GRADUATE WORK IN THE SUMMER QUARTER

Candidates for the Master's degree may complete the residence requirement for such a degree by pursuing graduate work at the University for three full Quarters. For the benefit of those who cannot stay during the entire Summer Quarter, this Quarter is divided into two equal terms; and candidates for the Master's degree may complete their residence requirement by pursuing graduate work for *four* summer terms, provided that in the *ad interim* periods between the Summer Quarters a satisfactory amount of work is completed under the direction of one or more members of the instructional staff of the department in which the student is specializing. The amount of such work that will be credited towards any advanced degree is limited to fifteen Quarter-hours, and the amount during any one *ad interim* period to eight Quarter-hours. Hence, under this plan the four terms cannot be taken in two Summer Quarters.

No student is allowed to pursue *ad interim* work unless he has been in residence in the Graduate School of this University at least one term of a Quarter. Moreover, it is optional with any member of the instructional force as to whether or not he will conduct such work.

A student who wishes to pursue *ad interim* work will proceed as

follows: Before the close of the Summer term in which he is in residence he will obtain from the office of the Graduate School an appropriate card and, after consultation with the professor in charge of the proposed *ad interim* work, will enter upon this card a brief outline of the work to be pursued in the *ad interim* period. After securing the signature of the professor, thus signifying his willingness to conduct the proposed *ad interim* work, the student will deposit this card in the office of the Graduate School. As an evidence of earnest intentions, he must also register in the University (this does not imply attendance) for at least one Quarter of each period during which the *ad interim* work is being pursued. He is also required to report to the professor conducting his work at least once a month and to pass such examinations as may be prescribed. He may secure from the University Library such books as may be necessary for the successful conduct of the work, but will be required to pay for the cost of shipment. Requests for such books should be sent to the Dean of the Graduate School.

OFF-CAMPUS RESEARCH WORK

A student who for any reason desires to carry on off-campus research work in connection with his thesis or dissertation must have his program approved in advance by the appropriate department and by the Graduate Council and must maintain his registration in the Graduate School during this entire period, and must pay the regular fees. No student may carry off-campus research work unless he has been in residence in the Graduate School of this University for at least one Quarter.

THE FRANZ THEODORE STONE LABORATORY
(Formerly The Lake Laboratory)

The Franz Theodore Stone Laboratory on Gibraltar Island, Put-in-Bay, Ohio, affords exceptional opportunities for graduate students who wish to carry on research work in botany, entomology, and zoology during the summer. The general rules that apply to graduate work carried on at the University during the Summer Quarter apply equally to the graduate work taken at the Laboratory. The work of instruction is carried on by members of the University Faculty and by members of the faculties of other colleges and universities. Students interested in this work should send to the University Examiner for the Franz Theodore Stone Laboratory Bulletin.

REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

In general, the degree of Master of Arts will be conferred for specialization in work of a non-technical character, while the Master of Science degree will be conferred for specialization in work of a technical character. The degree of Master of Arts will usually be conferred upon candidates whose work lies in the departments properly included in the College of Arts and Sciences, the College of Education, or the College of Commerce and Administration, while the degree of Master of Science will

usually be conferred upon candidates whose work lies in the College of Agriculture, the College of Engineering, the College of Medicine, or the College of Veterinary Medicine.

Residence Requirement. A residence of three Quarters wholly devoted to graduate work is required; however, a student may reduce this residence requirement to two Quarters (taken in four terms of different summer Quarters) by completing in a satisfactory way fifteen Quarter-credit hours of *ad interim* work as outlined on pages 33 and 34. Moreover, a graduate of this University may do not to exceed one-half of the required work at another institution having equivalent opportunities for study. The candidate is, however, subject to final examination by The Ohio State University on all work offered for the degree.

A student holding a graduate assistantship must spend at least six weeks in addition to the three Quarters, in order to fulfill the residence requirement. For a part-time assistant, a minimum residence of four Quarters is required, during one of which he must devote full time to his graduate work.

Students entering from other accepted graduate schools will be credited with work already completed, provided authorized statements are presented to the effect that such students have credit in the graduate school for the work specified. *However, no student will be given a degree by The Ohio State University unless he has satisfactorily completed forty-five Quarter hours of work under the guidance of this University.*

A candidate for the Master's degree must be registered in the Graduate School during the Quarter in which he expects to receive the degree, unless excused in advance by the Graduate Council from such registration.

Course of Study. The course of study shall be selected in consultation with the student's adviser (see page 30). It must show a reasonable degree of concentration on interrelated subjects and must be pursued under at least two professors. The course of study outlined shall be subject to the approval of the Dean of the Graduate School.

While qualification for the Master's degree is not based entirely upon the completion of a definite number of hours of work, nevertheless, the amount of work required will usually aggregate not less than the equivalent of fifteen hours of classroom work throughout three Quarters, inclusive of the thesis.

Standard of Work Required. A graduate student doing acceptable work for the Master's degree must attain the mark "A" or "B" in not less than two-thirds of the work included in the course of study outlined for his degree, and the mark of "C" or higher in the remaining one-third.

Admission to Candidacy. Each candidate for a Master's degree must file his application for admission to candidacy for the degree with the Dean of the Graduate School at a date not later than two weeks after the opening of the Quarter in which the degree is sought. The applications are made upon special blanks secured from the office of the Graduate School. These applications are passed upon by the Executive Committee

of the Graduate Council. Admission to candidacy is based upon undergraduate training and ability to pursue graduate work as revealed by the official reports upon the student's course. No student will be admitted to candidacy until he has completed at least the equivalent of one Quarter's work.

Examination. The candidate for a Master's degree is required to pass the regular final examinations in all courses for which he is registered and must receive grades in accordance with the regulations of the Graduate School. A general comprehensive examination also is required to test the candidate's knowledge of the study which he has mainly pursued. This general examination is conducted by a committee appointed by the Dean of the Graduate School and is composed of the candidate's adviser (chairman) and at least one other member of the instructional force nominated by him. The general examination may be either written or oral at the option of the examining committee. The chairman of the committee is responsible for arranging the examination and for certifying its results to the Dean of the Graduate School. The general examination shall not be held until after the submission and approval of the thesis. The general examination may be waived by the Dean of the Graduate School upon the written recommendation of the candidate's adviser in the case of students having an unusually high record of scholarship.

A candidate who fails in his general examination must register in the Graduate School and carry on work for an additional Quarter before an opportunity will be given for a second general examination, unless special permission is granted by the Graduate Council for an earlier examination at the request of the department concerned.

Thesis. A satisfactory thesis is required. The subject of the thesis, together with the written approval of the professor directing the work, must be filed in the office of the Graduate School at a date not later than that on which the candidate applies for admission to candidacy.

A candidate who expects to receive his degree at the end of a given Quarter must submit the completed manuscript of his thesis ready for typewriting to his adviser not later than three weeks prior to Commencement Day. If the manuscript is approved the candidate proceeds at once to prepare two typewritten copies of the same, following specifications which may be obtained at the office of the Graduate School. The thesis so prepared shall be presented for acceptance to the candidate's adviser, at least one week prior to Commencement Day. If the thesis is then approved the student shall deposit it in duplicate with the University Editor *not later than five days before Commencement Day*, and shall pay to the Editor a fee covering the cost of binding the same.

In case the thesis has already been published, the candidate, instead of following the above procedure, may present two printed copies to his adviser, not later than three weeks prior to Commencement Day. The form of printing as well as the contents must be approved by his adviser. If the thesis is so approved the student shall deposit these copies with

the University Editor *not later than five days before Commencement,* and shall pay to the Editor a fee covering the cost of binding the same.

The thesis requirement may be waived by the Dean of the Graduate School upon the written recommendation of the candidate's adviser. In all cases where the requirement is waived action must be taken prior to the date for the filing of the thesis subject.

Abstract of Thesis. In addition to the two approved copies of the thesis which must be deposited with the University Editor, each candidate must deposit in the office of the Graduate School one approved, typewritten copy of an abstract of the thesis of approximately three hundred words in length. At the close of each Quarter the Graduate Council will proceed immediately to print the abstracts of all the theses submitted during the Quarter, and to bind these together, in sufficient numbers to meet the exchange list of the University Library. Each candidate must deposit with the Bursar of the University not later than five days prior to date of graduation the sum of $5.00 *in cash.* This sum will be used by the Graduate Council to defray expenses connected with the editing, the printing and the binding of the abstracts of theses.

Time Limit on Work for Master's Degree. The entire work for the Master's degree must be completed within a period of six years.

Diploma Fee. A special graduation fee of $10.00 is required of each person receiving a graduate degree from the University. This fee must be paid one week *before* the close of the Quarter in which the candidate expects to receive his degree.

GRADUATE COURSE IN SOCIAL ADMINISTRATION

There is apparent need for the social work executive of professional status, indoctrinated in the philosophy of social work, acquainted with its fundamental processes, and keenly appreciative of its objectives and accomplishments. The demonstrated values of specialization should be conserved and enriched by cooperative procedure based on executive grasp of the broad implications of local social work organization whatever form such community organization may take. The principal object of this course is to prepare men and women for executive positions in Councils of Social Agencies, Playground and Recreation Associations, County Boards of Welfare, Community Chests, Family Service Societies, Municipal Welfare Departments, Probation Departments, Red Cross Organizations, State Boards of Charities, Child Welfare Agencies and other community organizations of charitable and philanthropic activities, both governmental and voluntary.

REQUIREMENTS FOR ADMISSION TO THE GRADUATE COURSE IN SOCIAL ADMINISTRATION

To be admitted to this course students should have had fundamental courses in the social sciences and in psychology.

Students whose general education, maturity, and experience justify it, may be admitted to the course, subject to the approval of the in-

structor, without becoming candidates for the degree and pursue subjects for which they are qualified.

REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN SOCIAL ADMINISTRATION

This course for properly qualified students leads to the degree of Master of Arts in Social Administration. To receive this degree, students must be in residence at The Ohio State University for the Autumn, Winter, and Summer Quarters; in addition, the Spring Quarter must be devoted to field work with a social agency aproved by the University. Upon the passing of an examination upon the subjects required and upon the completion of a satisfactory thesis, which is required of all candidates for the Master's degree, the degree of Master of Arts in Social Administration will be conferred.

CURRICULUM IN SOCIAL ADMINISTRATION

Autumn Quarter		Winter Quarter		Spring Quarter	
Sociology (813) The Community Chest Movement	4	Sociology (814) Contemporary Social Work	4	Field Work	
Sociology (870) Research in Special Problems		Sociology (870) Research in Special Problems			
Sociology (Elective) (834) Development of Social Agencies	2	Sociology (836) National Social Work Agencies and Local Programs	3	Summer Quarter	
Sociology (845) Methods of Sociological Investigation	4	Sociology (846) Methods of Sociological Investigation	4	Sociology (815) Interpretation of Social Work	4
Sociology (838) Social Case Work	3	Sociology (670) Community Health Organization	3	Sociology (870) Research in Special Problems	
Sociology (Elective) (835) The Social Worker and Community Groups	3			Sociology (837) Budgeting Community Social Work	3

For those who for any reason do not follow the regular curriculum there are available the following courses for election: Public Health; Leisure and Recreation; Organization and Administration of Recreation Agencies; Criminology; Penology; the Handicapped, Defectives, and Dependents; Needy Families and Children; the Race Problem; Municipal Sociology; Rural Social Institutions; Social Statistics.

GRADUATE COURSE IN PUBLIC ADMINISTRATION

It is the object of this course to prepare students for a career in the public service, particularly in municipal administration and in the foreign service.

REQUIREMENTS FOR ADMISSION TO THE GRADUATE COURSE IN PUBLIC ADMINISTRATION

To be admitted to this course, students must have completed the curriculum in Public Administration in the College of Commerce and Administration or its equivalent.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PUBLIC ADMINISTRATION

This course, in connection with that offered in the College of Commerce and Administration, for properly qualified students, leads to the degree of Master of Science in Public Administration. To receive this degree, students must be in residence at The Ohio State University for at least three Quarters. Upon the passing of the usual examinations and upon completion of a satisfactory thesis, which is required of all candidates for the Master's degree, the degree of Master of Science in Public Administration will be conferred. The Master's degree should be received at the end of a year of four Quarters, one of which must be devoted to field work with some governmental or research agency approved by the adviser. A report upon such field work must be filed with the adviser and approved by him. Organizations with which field work may be done include: the State of Ohio, the principal cities of the state, the important counties of Ohio, the Ohio Institute, the Ohio Chamber of Commerce, and numerous other organizations of local or state-wide scope.

CURRICULUM IN PUBLIC ADMINISTRATION

GENERAL REQUIRED COURSES

Autumn Quarter	Winter Quarter	Spring Quarter
Political Science (801) 3-5 Research Seminar	Political Science (802) 3-5 Research Seminar	Political Science (803) 3-5 Research Seminar

MUNICIPAL ADMINISTRATION (OPTIONAL)

Sociology (813) 4 The Community Chest Movement	Sociology (670) 3 Community Health Organization	Sociology (668) 3 Community Organization
Accounting (608) 4 Cost Accounting	Accounting (504) 4 Cost Accounting	Sociology (671) 3 Community Health Organization
Political Science (809) 3-5 Municipal Government	Political Science (807) 3-5 Public Opinion and Political Parties	Political Science (808) 3-5 Public Administration

FOREIGN SERVICE (OPTIONAL)

Geography (628) 3 Geography of South America	History (630) 3 Diplomacy of Europe	History (629) 3 Modern Germany
Political Science (611) 5 Jurisprudence	Geography (624) 3 Caribbean Region	History (628) 3 Reconstruction of Europe
Political Science (806) 3-5 Comparative Government	Geography (634) 3 Trade Centers and Trade Routes	Geography (625) 3 Geography of the Far East
	Political Science (810) 3-5 International Relations	

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Scholastic Requirements. The general requirements for the degree of Doctor of Philosophy are: (1) A reasonable mastery of the field of specialization chosen, tested by a general comprehensive examination given approximately one year previous to the date on which the candidate expects to come up for the degree; (2) a reading knowledge of two foreign languages (usually French and German); (3) the presentation of an acceptable dissertation embodying the results of an original in-

vestigation; and (4) the passing of a final examination upon the dissertation and the immediate field in which the investigation lies.

Residence Requirement. While it is not intended that the degree shall be given as a certificate of faithful and industrious work for a specified length of time, yet it is not believed that the scholastic requirements as given above can be secured by less than the equivalent of three years work devoted wholly to graduate study and investigation, with suitable facilities and under proper supervision. Of these years, at least one, and that except by permission of the Graduate Council, the last, must be spent in residence at this University. In case any part of the work is done elsewhere than in this University, such work shall be subject to the approval of the Graduate Council.

A candidate for the degree of Doctor of Philosophy must be registered in the Graduate School during the Quarter in which he expects to receive the degree, unless excused in advance by the Graduate Council from such registration.

Course of Study. The course of study to be pursued for the Doctor's degree will be arranged with each student by the candidate's adviser, but the choice of work must be approved as a whole by the Dean of the Graduate School. Work in other departments will be advised according to the needs of the individual student. In all cases the aim will be a reasonable concentration and a reasonable breadth of study, designed to foster both a knowledge of the specialty in relation to allied branches of learning and the power of productive scholarship.

Language Requirement. A reading knowledge is required in at least two foreign languages in which there is a substantial body of scholarly literature bearing upon the student's field of specialization. By a reading knowledge is meant a knowledge sufficient to enable the student to use the languages for the purposes of research. Under this general provision it is within the province of each department to define more specifically its language requirement, subject to the approval of the Graduate Council, by specifying one or both of the two required languages and by designating, generally or specifically, more than two foreign languages to be required of the student.

Before a student will be permitted to take his general examination, he must pass an examination in the languages required. The examination is conducted by the language department concerned. The subject matter of the examination shall be drawn from the literature of the student's field of specialization. Blanks for reporting the results of the examination may be obtained at the office of the Graduate School.

The following review courses in French and German have been arranged for students whose training in languages is deficient: French 405 and German 501. These courses will not carry graduate credit.

General Examination and Admission to Candidacy. Not later than the middle of the second Quarter prior to the Quarter in which he expects to come up for his degree, a candidate for the degree of Doctor of Philosophy is required to pass a general comprehensive examination on the

fundamentals of the entire field in which he has elected to specialize without limitation to the courses which the candidate has pursued. For example, a candidate for the degree at the end of the Spring Quarter must pass this general examination not later than the middle of the Autumn Quarter. This examination must be a written one but an additional oral examination may be given if the committee in charge of the examination so elects. The satisfactory passing of this examination carries with it admission to candidacy for the degree. After this general examination has been passed, the student will be given complete freedom from all course requirements during the remainder of his work and will be registered for "Dissertation" only. However, he will be permitted to audit any courses he may choose. No candidate will be permitted to take the general examination until after he has passed the language examinations.

The general examination shall be conducted by a committee consisting of the candidate's adviser (who shall act as chairman), the chairman of the department in which the candidate is specializing, and such other examiners as the Dean of the Graduate School shall designate, including two who are not members of the department directly concerned. At the close of the examination the committee shall certify to the Graduate School, on an appropriate blank furnished the committee, whether or not the candidate has passed the examination. This report, when properly signed by the committee, shall be considered as the candidate's petition for admission to candidacy.

Dissertation. A dissertation which shall make a definite contribution to knowledge of importance sufficient to warrant its publication shall be offered by the candidate. *A copy of the dissertation bearing the written approval of the candidate's adviser must be presented to the Dean not less than four weeks previous to the end of the Quarter in which the degree is sought.*

The Dean, after consultation with the candidate's adviser shall then appoint a Committee to consider the merit of the dissertation. The dissertation, together with the report of this Committee, shall be laid before the Council, who will then vote upon the question of its acceptance.

Each candidate must deposit in the office of the Graduate School, not later than five days prior to Commencement Day, two *approved* printed or typewritten copies of the complete dissertation, complying in form with specifications obtainable in the Graduate School office. Along with the copies of the dissertation, the candidate must also deposit a sum sufficient to cover the cost of binding the same ($1.50).

The Final Examination. The final examination shall be held after the approval of the dissertation, at such time as the Dean shall appoint. It shall be conducted by a committee consisting of the candidate's adviser (who shall act as chairman), and such other examiners as the Dean of the Graduate School shall designate, including two who are not members of the department directly concerned. The examination shall be oral and shall deal intensively with the portion of the candidate's field of specialization in which his dissertation falls, though it need not be

confined exclusively to the subject matter of the dissertation. A written examination also may be required at the discretion of the department concerned. The final examination may include also any portion of the student's work in which his general examination has shown his knowledge to be defective and which the committee in charge of the general examination has directed him to review.

Abstract of Dissertation. Each candidate must also deposit in the office of the Graduate School, not later than five days prior to Commencement Day, one *approved* typewritten copy of an abstract of the dissertation, approximately three thousand words in length. He must also deposit with the Bursar of the University, not later than five days prior to the date of graduation, the sum of $50.00 *in cash.* This sum will be used by the Graduate Council to defray the expenses connected with the editing, printing, and binding of the abstracts of dissertations.

Diploma Fee. A special graduation fee of $10.00 is required of each person receiving a graduate degree from the University. This fee must be paid one week *before* the close of the Quarter in which the candidate expects to receive his degree.

COMMENCEMENT—CONVOCATION

A special Convocation or Commencement is held at the close of each Quarter for the conferring of degrees upon candidates who have fulfilled all the requirements of their respective courses.

ATTENDANCE AT CONVOCATION EXERCISES

All candidates for degrees are required to be present at their graduation convocation unless excused by the President. Only those students who are to receive their degrees at a given convocation may appear in the class procession on that occasion or be seated with the graduating class.

THE PLANT INSTITUTE

The Plant Institute of The Ohio State University is an organization within the College of Agriculture for furthering research with plants. It affords graduate students the combined facilities of the departments of Botany, Horticulture, Farm Crops, Agricultural Chemistry, and Soils.

The instructional force and graduate students of these departments meet in a seminary for the discussion of problems connected with plant life.

The Institute, through its executive committee consisting of representatives from the several departments, reviews all thesis projects of candidates for higher degrees majoring in plant subjects in the departments of the College.

UNIVERSITY ORGANIZATIONS

There are a number of organizations in the University of especial interest to the graduate students. The Gamma Alpha Fraternity, the

graduate scientific society, has its own house at which a number of the members of the society live and a still larger number board. There is also a Junior Open Court composed of not more than two representative members of the various departments; likewise the Graduate Club in social educational sciences, and the Graduate Women's Club.

The main object of all of these clubs is to bring members together for social purposes and for the discussion of the various problems in which the individual members are interested.

There are also chapters of the national honorary societies, Phi Beta Kappa and Sigma Xi, as well as a number of honorary fraternities. In addition to these, nearly every department offering graduate work has its own graduate club.

UNIVERSITY LECTURES

Each year a number of lectures of special interest to graduate students are given by distinguished scholars from various educational institutions. Some of these lectures are of interest primarily to those in certain fields of work while others are of a general character and of interest to graduate students in general, no matter what their fields of activity may be.

DEPARTMENTS OF INSTRUCTION

COURSES OF GENERAL INTEREST

The courses listed below are of such a character as to be of general interest to all graduate students irrespective of their fields of specialization. Experience has shown that the great majority of those students who are candidates for the degree of Doctor of Philosophy hope to become members of the instructional staffs of colleges. All such students should select the last course listed, viz., Principles of Education 860.

Survey Course 605. Foundations of Contemporary Civilization.

Survey Course 608. Development of Modern Science.

Survey Course 664. Student Economic Problems and the Adviser.

Survey Course 665. Principles of Psychology for Advisers.

Survey Course 801-802-803. Survey of Higher Education for College Teachers.

(For a full description of these courses see page 262 of this Bulletin, under the heading "Survey Courses".)

***Philosophy 805. Scientific Method.**

***Philosophy 806. Epochs in the History of Thought.**

(For a detailed description of these courses see page 180 of this Bulletin.)

Principles of Education 860. College Teaching.

(For detailed description of this course see page 220 of this Bulletin.)

ACCOUNTING

Office, 309 Commerce Building

ASSOCIATE PROFESSORS TAYLOR, HECKERT, AND MILLER, ASSISTANT PROFESSOR WILLCOX, MR. BOLON, MR. WALL, MR. SHONTING, MR. FRICKEY, MR. LOGAN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: An acceptable course in the elements of accounting in addition to any prerequisites stated in the description of the courses.

601. Advanced Principles of Accounting. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lectures and recitations each week. Mr. Taylor, Mr. Heckert, Mr. Miller, Mr. Shonting, Mr. Logan.

The principles of modern accounting, especially those connected with the corporate balance sheet and income statement. Accounting problems arising in the organization of a corporation. Treatment of capital stock and bond issues, depreciation. Various forms of income statements in typical manufacturing enterprises. Principles of valuation of assets.

* Not given in 1932-1933.

602. Advanced Principles of Accounting. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lectures and recitations each week. Prerequisite, Accounting 601. Mr. Taylor, Mr. Miller.

The accounting procedure in connection with corporate reorganization and dissolution. Consolidated balance sheets and income statements, branch house accounting, foreign exchange accounting.

603-604. Cost Accounting. Four credit hours. Two Quarters. 603, Autumn and Winter; 604, Winter and Spring. Three lectures and recitations and one two-hour laboratory period each week. Prerequisite or concurrent, Accounting 601. Not open to students who are taking Accounting 624. Mr. Willcox.

Accounting 603: General methods of collecting costs of material, labor, and burden and incorporating them in the books of account. Cost control including the use of the perpetual inventory and various subsidiary ledgers.

Accounting 604: Various methods of distributing burden costs. Presentation of cost data. Problems of cost accounting in multiple process industries.

605. Problems in Cost Accounting. Three credit hours. Autumn Quarter. Prerequisite, Accounting 604 or 624. Mr. Heckert.

A study of special problems in cost accounting supplementary to the general introductory material given in prerequisite courses. Special attention is given to the treatment of process, by-product, and joint-product costs, methods of estimating and predetermining costs, and adjustments in cost finding procedure required by abnormal production conditions.

606. Institutional Accounting. Two credit hours. Spring Quarter. Two hours of lectures, problems and recitations each week. Open to students who are registered in Home Economics 631 and who have taken Accounting 405. Mr. Shonting.

The principles of accounting as applied to the operation of institutions. Special attention is devoted to food cost accounting procedure and to the use and interpretation of accounting reports for managerial control.

607-608. Auditing. Two credit hours. Two Quarters. 607, Autumn and Winter; 608, Winter and Spring. Prerequisite, Accounting 602 and 604. Mr. Wall, Mr. Miller.

The various kinds of audits and their respective uses. Methods followed in verifying balance sheets and profit and loss accounts. Audit reports and certificates. Duties and responsibilities of an auditor.

***610. Cost Accounting System.** Three credit hours. Winter Quarter. Prerequisite, Accounting 604 or 624.

A study of cost accounting systems of various types, including practice in designing forms and procedure for representative industries. Attention is given to uniform cost systems adopted by various trades.

611. Income Tax Accounting. Two credit hours. One Quarter. Autumn and Spring. Two hours of lectures, problems, and recitations each week. Prerequisite, Accounting 601. Mr. Miller, Mr. Bolon, Mr. Frickey.

The accounting principles and procedure involved in the Federal taxes on income and profits. Practice in preparing income tax returns from the accounts of individuals, partnerships, and corporations.

* Not given in 1932-1933.

612. Constructive Accounting. Four credit hours. One Quarter. Autumn and Spring. Four hours of lectures, problems, and recitations each week. Prerequisite, Accounting 603-604. Mr. Heckert.

Practice in designing accounting systems for typical business enterprises.

613-614. Accounting Practice. Four credit hours. Two Quarters. 613, Autumn and Winter; 614, Winter and Spring. Four hours of lectures, problems, and recitations each week. Prerequisite, Accounting 602 and 604. Mr. Taylor, Mr. Miller.

Practice in the solution of typical accounting problems. The class material is taken largely from the Certified Public Accountants' examinations of the various states.

616. Business Statements. Three credit hours. One Quarter. Autumn, Winter, Spring. Three hours of lectures and problems each week. Prerequisite, Accounting 601. Mr. Bolon.

A study of the different kinds of statements prepared by corporations for the guidance of executives, directors, stockholders, and creditors. The methods used in preparing the necessary statements together with the principles of statement interpretation. Use is made of current statements of well-known corporations. Lectures and problems.

617-618. Managerial Accounting. Three credit hours. Two Quarters. 617, Winter; 618, Spring. Prerequisite, Accounting 604 or 624, and a course in economic statistics. Mr. Heckert.

The organization and function of the controller's department. The use of accounting records and statistics in setting standards and measuring performance by these standards. The preparation, presentation and interpretation of accounting reports for the purpose of controlling sales, production, purchasing, credit, equipment, inventories, costs and expense. Internal checks. Budget procedure and methods of budget control.

***621. Fiduciary Accounting.** Two credit hours. Winter Quarter. Prerequisite, Accounting 601 and Economics 631-632. It is strongly urged that Economics 633 be taken previously or concurrently. Mr. Frickey.

The principles underlying the accounting problems encountered in the administration of trust estates. Records and statements of receivers, trustees, executors and administrators. Special attention is devoted to the accounting aspects of the Federal Income Tax Law, the Federal Estate Tax, and the Ohio Inheritance Tax. Lectures and problems.

622. Advanced Accounting Theory. Three credit hours. Spring Quarter. Prerequisite, Accounting 601 and 602. Mr. Wall.

An examination of some of the prevailing theories of accounting. Recent theories in connection with the valuation of assets; the determination of income and surplus. Each student is required to make a report covering the investigation of some particular subject. Lectures, recitations, and readings.

623. Retail Accounting. Three credit hours. Autumn Quarter. Three lectures and recitations each week. Not open to students who are taking Accounting 612 or doing major work in the Accounting group. Mr. Frickey.

The principles of accounting as applied to the operations of retail merchandising enterprises. A study of the forms and procedure used in retail stores, with particular reference to the systems of the department stores, chain stores, and other establishments prominent in the field. The course is intended primarily for students whose major interest is in fields other than accounting.

* Not given in 1932-1933.

624. Factory Costs. Five credit hours. Spring Quarter. Five hours of lectures and recitations each week. Not open to students taking Accounting 603-604. Mr. Willcox, Mr. Frickey.

A study of factory accounting methods, with particular reference to the handling of material, labor and finished goods records, expense distribution, and cost finding procedure in general. The course is intended primarily for students whose major interest is in fields other than accounting. Emphasis is placed on the relationship of the cost accounting work to that of other factory departments, such as supervision, production, and engineering.

625. Bank Accounting. Two credit hours. Spring Quarter. Two hours of lectures and recitations each week. Prerequisite, Business Organization 670. Mr. Willcox.

A study of bank accounting methods with particular reference to departmental expenses and revenues. This course is intended primarily for students whose major interest is in the field of banking.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research in Accounting. Permission of the instructor necessary.

804-805-806. Graduate Seminary in Accounting. Two credit hours.

ADULT EDUCATION

Office, 300 Education Building

ASSISTANT PROFESSOR CHARTERS

CURRICULUM FOR PROFESSIONAL LEADERS IN ADULT EDUCATION

There is a limited but increasing demand for professional workers in the field of adult education. The Department of Adult Education selects candidates for higher degrees on the basis of personality, character of previous training and other pertinent experiences, and quality of academic work. Selection of courses in correlated departments will depend upon the field of specialization and past training.

For students interested in parental education, selection may be made from the following advanced undergraduate and graduate courses:

Psychology	(605) 3	Public Health	(608) 2
Psychology	(606) 3	Principles of Education (620)	3
Psychology	(610) 3	or	
Psychology	(616) 2	Principles of Education (640)	
Psychology	(621) 3	Home Economics	(621) 5

Adult Education 609 is required of all students. Students majoring in parental education are expected to have credit for Adult Education 401, or its equivalent. If this is not the case, arrangements will be made for them to secure the content material in the field.

For students interested in leadership training for adult groups selection should be made from the following advanced undergraduate and graduate courses:

Psychology	(605) 3	Principles of Education (620)	3
Psychology	(606) 3	or	
Psychology	(608) 4	Principles of Education (640)	
Psychology	(621) 3	Sociology	(665) 3

Sociology 602, 603, 604 should be taken by students who have not had Sociology 401-402.

Courses in the Department of Adult Education required for the above students are:

Adult Education	(609) 2	Adult Education	(615) 3

FOR ADVANCED UNDERGRADUATES AND GRADUATES

609. Theory and Problems of Adult Education. Two credit hours. One Quarter. Autumn, Winter, Spring. Two lecture hours, reports, discussions, and extensive reading. Mrs. Charters.

Historical and international survey of the adult education movement. Relation of parental education to the adult-education movement; theories and problems of organization, curriculum material, and methods of teaching parents' study groups. Background course for leaders and others intending to specialize in parental education. Admission only after consultation with instructor.

615. Leadership Training. Three credit hours. Winter Quarter. Three classroom hours, field work, readings. Mrs. Charters.

Lectures, project supervision, and field laboratory work with parents' study groups. Methods of teaching parental education, not subject matter of child study. Only students with an adequate background of psychology, sociology, education, and experience will be admitted for credit.

650. Minor Problems. One or more credit hours. Autumn, Winter, and Spring Quarters. Mrs. Charters.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

815. Advanced Leadership Training. One credit hour. Autumn, Winter, and Spring Quarters. Bi-weekly throughout the year. Conferences, lectures, reading, and supervision of adult education programs. Mrs. Charters.

This course is intended for persons in organizations and institutions who are engaged in directing work in adult education throughout the state, particularly in the field of parental education.

The basic and preparatory courses for work in the Department of Adult Education lie in the fields of sociology, psychology, principles of education, home economics, and physiology.

AGRICULTURAL CHEMISTRY

Office, 211 Townshend Hall

PROFESSOR LYMAN, ASSISTANT PROFESSORS ALMY AND BURRELL

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in the elements of agricultural chemistry in addition to any prerequisites stated in the description of the courses. Course 602 requires also an acceptable course in organic chemistry and quantitative analysis, or a course in agricultural analysis; 607 an acceptable course in physiology; and 608 an acceptable course in animal husbandry.

601. General Biological Chemistry. Five credit hours. One Quarter. Autumn and Winter. Three lectures and two three-hour laboratory periods each week. Mr. Burrell.

A study of the chemistry of the fats, carbohydrates, proteins, and other compounds of biological importance, and the general chemistry of the metabolism of plants and animals. This course is intended for students majoring in biological subjects, and as a prerequisite to certain advanced courses in this department.

602. Food Inspection and Analysis. Five credit hours. Spring Quarter. One lecture and four three-hour laboratory periods each week. Mr. Almy.

Lectures on the composition of foods, methods of analysis, and the detection of

adulteration in foods. Laboratory work includes the analysis of cereal foods, milk, edible fats and oils, and carbohydrate foods. This course is designed to familiarize the student with the official methods used in government and commercial laboratories in the examination of the commoner groups of food products.

604. Dairy Chemistry. Five credit hours. Autumn Quarter. Two lectures and three three-hour laboratory periods each week. Mr. Almy.

The constituents of milk are studied, using lectures, textbooks, and assigned readings. Laboratory work includes the separation and study of the constituents of milk.

605. Dairy Chemistry. Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 604. Mr. Almy.

A continuation of Agricultural Chemistry 604. A study is made of the application of some physico-chemical principles in the field of Dairy Technology.

606. Advanced Dairy Chemistry. Five credit hours. Spring Quarter. One lecture and four three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 605. Mr. Almy.

Laboratory and lectures on the analysis of dairy products, milk, condensed milk, dried milk, and butter. This course is designed to teach the methods of analysis used in the chemical control of manufacturing plants and the legal control of dairy products.

***607. Chemistry of Nutrition.** Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Mr. Lyman.

Lectures on the chemistry of nutrition. Laboratory work includes experiments on digestion and utilization of food, determination of fuel value of food and the heat production of man under various conditions, the analysis of blood for waste products of metabolism, the effects on small animals of diets consisting of purified food constituents, and the effects of selected diets on the formation of waste products in the body.

608. Animal Nutrition. Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 601. Mr. Lyman.

Lectures on the chemical problems involved in growth, maintenance and fattening of animals, and in the production of milk and work. The composition of feeds and farm rations is discussed from the standpoint of the more recent conception of animal nutrition. Laboratory work includes the determination of coefficients of digestibility, the determination of protein and mineral storage during growth, a study of the energy requirement, and the effect of selected rations on animals.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. All instructors.

Students electing this course must have had at least two five-hour courses in the department. Consent of the department must be secured.

FOR GRADUATES

Prerequisite for Graduate Work: For a student majoring in agricultural chemistry at least six Quarters of work in chemistry is required as a prerequisite. This work must include acceptable courses in general and organic chemistry and quantitative analysis.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Plant Chemistry. Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite,

* Not given in 1932-1933.

Agricultural Chemistry 601 or its equivalent and the consent of the instructor. Mr. Burrell.

Lectures, laboratory, and collateral reading on special phases of the chemistry of plant metabolism.

802. Special Problems. Five to fifteen credit hours. Autumn, Winter, and Spring Quarters. A total of fifteen credit hours may be obtained in this course by continuing the course for three Quarters. Laboratory, library, and conference work amounting to fifteen hours each week. Prerequisite, Agricultural Chemistry 601 and the consent of the instructor. Mr. Lyman, Mr. Burrell, Mr. Almy.

This course consists of studies of special methods, such as the separation of the fatty acids from a selected fat, the preparation of certain carbohydrates, or animal acids, the determination of the distribution of nitrogen in a protein by the Van Slyke method, or minor problems in animal or plant nutrition. The student will choose, with the advice of the instructor, the particular problem to be studied. This course is recommended as part of a minor toward an advanced degree.

803. Research. Five, ten, or fifteen credit hours. Autumn, Winter, and Spring Quarters. Laboratory, library, and conference work. Prerequisite, consent of the instructor. Mr. Lyman, Mr. Burrell, Mr. Almy.

Research may be done in nutrition, plant chemistry, food analysis, or dairy chemistry.

804. Seminary. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in agricultural chemistry. Mr. Lyman.

AGRICULTURAL EDUCATION

Office, 323 Campbell Hall

PROFESSOR STEWART, ASSISTANT PROFESSORS KENESTRICK AND JACKSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in vocational agriculture.

601. Special Methods of Teaching Vocational Agriculture in Secondary Schools. Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Mr. Kenestrick, Mr. Jackson.

An intensive application of the information and practices given in the preceding departmental courses to the preparation of material for specific agricultural courses. The organization of subject matter for effective presentation in the classroom, the planning of lessons, laboratory work, and field trips, the methods of teaching through project supervision, and the organization of part-time courses.

602. History of Agricultural Education. Five credit hours. Winter Quarter. Five recitations each week. Mr. Jackson.

A study of the development of agricultural education, including not only institutional development but also attending agencies, such as fairs, extension teaching, part-time instruction, etc.

603. Agricultural Education and the Vocational Education Movement. Five credit hours. Spring Quarter. Five lectures each week. Mr. Stewart.

A study of the development of agricultural education in its relation to the vocational education movement, including commercial, industrial, and home-making education.

†605. **Project Records and Analysis.** Three credit hours. Spring Quarter. Three discussion periods each week. Prerequisite, permission of the instructor.

A study based upon researches in project accounting and analysis promoted in Ohio in recent years. Conditions in the field are studied from this assembled material and the findings derived from it. A program of improvement is determined.

607. **The Conference Method Applied to Instruction in Agriculture.** Three credit hours. Spring Quarter. Three discussions each week. Mr. Stewart.

An application of the principles of teaching to the techniques appropriate to the conference method of instruction. After a critical evaluation of the essential elements of this method, including appropriate problems, the leader's duties, possible procedures and techniques, and the limitations of the method. The course will be conducted on the project basis with each student acting as conference leader as time permits.

FOR GRADUATES

Special problems are designed particularly for the training of supervisors of agricultural education and trainers of teachers of vocational agriculture. In the study of special problems in the methods of observation of teaching vocational agriculture and in the methods of supervised teaching of vocational agriculture, opportunity will be provided for actual practice in conducting courses in observation teaching and supervised teaching in the department's training schools in out-lying villages. Opportunity for the study of special problems will be offered quarterly as enrollment for them demands.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. **Special Problems.** Three to twelve hours as arranged. Autumn, Winter, and Spring Quarters. Mr. Stewart, Mr. Kenestrick, Mr. Jackson.

Methods of observation teaching in agricultural education.
Methods of supervised teaching in agricultural education.
Special methods of teaching vocational agriculture.
Supervisors and the supervision of agricultural education.
Project organization and supervision in teaching vocational agriculture.
Visual education in teaching vocational agriculture.
Organization and methods of instruction in farm-shop courses.
Organization and methods of instruction in part-time courses.

803. **The Problem Method Applied to Secondary and College Teaching in Agriculture.** Five credit hours. Winter Quarter. Five discussion periods each week. Prerequisite, Agricultural Education 601. Other students may enroll by securing permission of the instructor. Mr. Jackson.

An inquiry into the conditions that promote effective teaching with a determination of procedures that contribute to this end. The possibilities of the problem method in agricultural education are fully explored.

*804. **State Administration and Supervision of Vocational Agriculture.** Three credit hours.

A course devoted to a consideration of the following: federal and state legislation relating to vocational agriculture; state plans; records and reports; standards and objectives; teacher training in service; supervisory procedures; state courses of study; placement and recommendations of teachers; promotion of state program; day, evening, and part-time school organizations; and other problems relating to the state administration and supervision of vocational agriculture.

* Not given in 1932-1933.
† Not given during the academic year, 1932-1933.

806. Organization and Administration of Teacher Training for Vocational Agriculture. Three credit hours. Winter Quarter. Five lectures each week. Mr. Jackson.

A course devoted to a consideration of the following: state plans for resident teacher training; working relations between teacher training departments and state supervisory organization; teacher training courses offered; analysis of the content of teacher training courses; provisions for observation and practice teaching; research in agricultural education; teacher placement and follow-up program.

†808. Organization and Methods of Conducting Part-Time and Evening Schools in Vocational Agriculture. Three credit hours.

A course devoted to an analysis of the problems related to part-time and evening schools in vocational agriculture and to the development of objectives and procedures in the organization and conduct of such instruction.

†809. Research for Teachers of Vocational Agriculture. Three credit hours. Mr. Stewart.

A course devoted to a study of research techniques and procedures appropriate to studies and researches in the field of agricultural education. The course will direct students to a study of procedures in the promotion of research with individual projects in planning, organizing, and projecting appropriate studies.

810. Seminar in Agricultural Education. One to three credit hours. Autumn, Winter, and Spring Quarters. All instructors.

A study of current problems in agricultural education. Provision for investigation, reports and discussion.

AGRICULTURAL ENGINEERING
Office, 105 Ives Hall

PROFESSORS McCUEN, REED, AND MILLER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in agricultural engineering, mathematics, and physics. Course 604 requires also a course in soils.

602. Farm Structures. Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. Mr. Miller.

A study of the functions, adaptability, safety, economy, materials, convenience, sanitation and appearance in the design, construction, repair, and use of farm buildings, fences and building equipment.

603. Advanced Farm Power and Power Machinery. Five credit hours. Autumn Quarter. Two recitations and three three-hour laboratory periods each week. Mr. McCuen.

A study of economy, use and maintenance of the farm tractor; its operation in the field. Includes also a study of the care and operation of ensilage cutters, feed grinders, threshing machines, corn huskers, and other heavy-belt machinery.

604. Farm Drainage. Five credit hours. Spring Quarter. Two lectures, two three-hour laboratory periods and other outside work each week. Mr. Overholt.

This course will include the systematic drainage of farm lands, grading, layout, etc. Drainage machinery and structure. A study of the mechanical control of soil erosion by means of terraces and the construction of soil-saving dams.

Sufficient practice with surveying instruments will be given to enable the student to solve all ordinary farm drainage problems.

† Not given during the academic year, 1932-1933.

605. Advanced Field Machinery. Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Mr. Reed.

A more detailed and complete study of field machinery than is possible in Agricultural Engineering 401. Designed for farm machinery users who want advanced work, for teachers, for those contemplating commercial work, and for those preparing for advanced special problems. Lectures, quizzes, and laboratory field work.

606. Special Agricultural Engineering Applications to Horticultural Practices. Five credit hours. Spring Quarter. Three three-hour laboratory periods each week. All instructors.

Primarily for students specializing in horticulture. Prime movers, power requirements, machines and implements for tillage, seed preparation, seeding, harvesting, combating crop enemies, and preparing horticultural products for market; irrigation of garden and orchard crops; mechanics of steam sterilization; engineering applications in storage technique.

*607. **Rural Power Line Extension.** Three credit hours. Autumn Quarter. Given in odd-numbered years. Three lectures or recitations each year. Mr. McCuen.

A detailed study of rural power line extensions, policies, rural rates, and the application of electricity to the farmstead power problems.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. All instructors.

Students selecting this course must have had at least two five-hour courses in the department, one of which must have been in line with the problem chosen. Consent of the department must be secured.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate work in agricultural engineering presupposes fundamental training in engineering as implied by a baccalaureate degree in engineering, or fundamental training in agriculture as implied by a baccalaureate degree in agriculture, or, preferably, fundamental training in both engineering and agriculture as implied by a baccalaureate degree in agricultural engineering. On account of the broadness of the fundamental requirements for a combination of agriculture and engineering, the applicant, if he cannot fully satisfy the requirements of the department, may be permitted to make up some deficiencies in preparation for his particular field. It is suggested that applicants confer early with the department of Agricultural Engineering regarding their status.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Three to ten credit hours each Quarter. Autumn, Winter, Spring. Library, conference and laboratory work. Time to be arranged. Permission of the department required. Mr. McCuen, Mr. Reed, Mr. Overholt, Mr. Miller.

AGRICULTURAL EXTENSION

Office, 115 Townshend Hall

DIRECTOR RAMSOWER, MR. SPOHN, DISTRICT SUPERVISOR

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600. Extension Education. Three credit hours. Spring Quarter. Lectures and discussion. Open to Seniors, graduate students, and with consent of instructor to other properly qualified students. Mr. Spohn.

In this course problems of special interest to Agricultural Extension workers will

* Not given in 1932-1933.

be considered. While the course will be supervised by one person, it is planned to bring in as instructors those familiar with extension work and educational methods for special lectures during the course.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Mr. Ramsower and instructors.

This course is intended for graduates who wish to work out problems in the field of Extension Education. Consent of the Director of Extension Service must be secured.

AMERICAN HISTORY

(See History)

ANATOMY

Office, 410 Hamilton Hall

PROFESSOR LANDACRE, ASSOCIATE PROFESSORS KNOUFF AND BAKER, ASSISTANT PROFESSORS EDWARDS AND SETTERFIELD

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in biological science and comparative anatomy in addition to any prerequisites stated in the description of the courses.

Courses 621-628 inclusive are open only to students doubly registered in the College of Medicine and the Graduate School; courses 628, 638, 639 and 640 are open only to students doubly registered in the College of Dentistry and the Graduate School, to the extent of fifteen Quarter hours.

601-602-603. Seminary. One credit hour. Autumn, Winter, and Spring Quarters. One conference each week. Prerequisite, two Quarters of anatomy. Required of all graduate students taking a major in anatomy. The staff.

Lectures by members of the staff, conferences on investigations being carried on in the department, and reports on recent investigations in anatomy. Subjects for extended study will be changed from Quarter to Quarter.

604-605-606. Advanced Anatomy: Minor Problems. Three or five credit hours. Autumn, Winter, and Spring Quarters. One conference and four or eight laboratory hours each week. Prerequisite, two Quarters of anatomy including 613; 619 recommended. The staff.

Students will be assigned problems in gross or microscopical anatomy.

607. Comparative Neurology: Minor Problems. Five credit hours. Autumn Quarter. One lecture or conference and eight laboratory hours each week. Prerequisite, Anatomy 617-618 or an equivalent. Mr. Landacre.

Students will be assigned definite problems on the structure of the central nervous system and sense organs.

608. Comparative Neurology: Minor Problems. Five credit hours. Winter Quarter. One lecture and eight laboratory hours each week. Prerequisite, Anatomy 617-618 or an equivalent. Mr. Landacre.

Students will be assigned definite problems on the structure of the central nervous system and sense organs.

609. Comparative Neurology: Minor Problems. Five credit hours. Spring Quarter. One lecture and eight laboratory hours each week. Prerequisite, Anatomy 617-618 or an equivalent. Mr. Landacre.

Students will be assigned definite problems on the structure of the central nervous system and sense organs.

611. **Cytology.** Five credit hours. Winter Quarter. Two lecture and six laboratory hours each week. Prerequisite, three Quarters of biological science including Anatomy 613 or an equivalent. Mr. Landacre.

An introductory course in cytology.

612. **Cytology.** Five credit hours. Winter Quarter. Two lecture and six laboratory hours each week. Prerequisite, three Quarters of biological science which must include Anatomy 613 or an equivalent. Class limited to ten students. Mr. Knouff.

Cytoplasmic relations and differentiations by vital and supravital methods.

613. **Comparative Anatomy of the Vertebrates.** Five credit hours. Autumn Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, elementary courses in zoology. A course in evolution is recommended. Mr. Setterfield.

The gross anatomy of the vertebrates.

Not open to students who have credit for Anatomy 401 or 406.

614. **Comparative Anatomy of the Vertebrates: Minor Problems.** Five credit hours. Winter Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Anatomy 613. Mr. Setterfield.

The gross anatomy of the vertebrates.

Not open to students who have credit for Anatomy 402.

615. **Comparative Vertebrate Embryology.** Five credit hours. Spring Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, two Quarters in zoology and Anatomy 613 or equivalent. One additional Quarter of anatomy is recommended, preferably 616. Class limited to ten students. Mr. Knouff.

An experimental and descriptive course on the development of one of the vertebrates.

Not open to students who have credit for Anatomy 403.

616. **Comparative Vertebrate Embryology.** Five credit hours. Winter Quarter. Two lectures or recitations and three two-hour laboratory periods each week. Prerequisite, Anatomy 613. Mr. Setterfield and assistant.

The development of the chick with especial emphasis on the formation of foetal membranes and on the development of the organs.

Not open to students who have credit for Anatomy 404.

617. **Elementary Neurology.** Five credit hours. Autumn Quarter. Two lectures and six laboratory hours each week. Prerequisite, Anatomy 613 and 619. Mr. Landacre.

The gross structures of the brain and sense organs of the higher mammals with special reference to their functional significance.

Not open to students who have credit for Anatomy 408.

618. **Elementary Neurology.** Five credit hours. Winter Quarter. Two lectures and six laboratory hours each week. Prerequisite, Anatomy 617. Mr. Landacre.

The study of the microscopic structures of the sense organs and of the spinal cord and brain of the higher mammals with special reference to reaction systems.

Not open to students who have credit for Anatomy 409.

619. Comparative Anatomy of the Vertebrates. Five credit hours. Spring Quarter. Two lectures or recitations and six laboratory hours each week. Prerequisite, Anatomy 613. Anatomy 616 is recommended. Mr. Setterfield.

The anatomy of the mammals with special reference to the cat.

Not open to students who have credit for Anatomy 413.

NOTE: Courses 621 to 640: Open only to students registered in the College of Medicine or in the College of Dentistry.

621. Human Anatomy. Five credit hours. Autumn Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the thorax and abdomen.

622. Human Anatomy. Five credit hours. Winter Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the extremities and perineum.

623. Human Anatomy. Five credit hours. Spring Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the head and neck, the central nervous system and sense organs.

624. Microscopic Anatomy. Five credit hours. Autumn Quarter. Two recitations, one lecture, and nine laboratory hours each week. Mr. Knouff.

The general histology of epithelium, connective tissues, blood and muscle and the special histology of the skeletal, muscular, vascular, integumentary, respiratory, digestive and endocrine systems.

625. Developmental Anatomy. Five credit hours. Winter Quarter. Two recitations, one lecture, and nine laboratory hours each week. The lecture hour may be replaced by a seminary hour. Mr. Knouff.

The histology of the urinary and reproductive organs and the general embryology of the mammal, with special reference to man.

626. Neurology. Five credit hours. Spring Quarter. Two recitations, one lecture, and nine laboratory hours each week. The lecture hour may be replaced by a seminary hour. Prerequisite or concurrent, Anatomy 623. Mr. Landacre.

The histology of the central nervous system and sense organs, and the study of the human brain and spinal cord, with special reference to the reaction systems.

627. Topographical Anatomy. Two credit hours. Autumn Quarter. One lecture or recitation and three laboratory hours. Prerequisite, Anatomy 621, 622, 623. Mr. Baker.

The topographical relations of gross anatomy based on surface and sectioned material.

628. Special Advanced Anatomy. Three credit hours. Winter Quarter. One conference or lecture and six laboratory hours each week. Prerequisite, Anatomy 627 or its equivalent, and permission of the instructor. Mr. Baker.

Students will select or have assigned to them special regions for dissection and study.

638-639. Human Anatomy. Seven credit hours. Autumn and Winter Quarters. Two recitations and fifteen laboratory hours each week. Mr. Edwards and assistants.

The gross anatomy of the body with special stress on the anatomy of the head and neck, including the osteology of these parts.

Not open to students who have credit for Anatomy 433 or 438-439.

640. Histology and Embryology. Five credit hours. Spring Quarter. Three recitations and six laboratory hours each week. Mr. Knouff and assistants.

The general histology of the tissues and the special histology of the skeletal, vascular, digestive, respiratory, urinary and nervous systems, including special embryological features of the teeth and histology of the reproductive system.

Not open to students who have credit for Anatomy 440.

FOR GRADUATES

Candidates for graduate degrees desiring to major in anatomy should present not less than four Quarters' work in biological science of which two Quarters must be in subjects listed in the Department of Anatomy.

For the present the Department of Anatomy is prepared to offer advanced students a choice of 607, 608, 609, or 611, 612, or 801, 802, 803, or 804, 805, 806. All these courses cannot be offered simultaneously. The instructor in charge must be consulted but an effort will be made to group students with a view to meeting their needs.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Advanced Anatomy. Five credit hours. Autumn Quarter. One conference and eight laboratory hours each week. Prerequisite, two years of biological science, of which one must be in anatomy or its equivalent. Mr. Landacre.

A student will be assigned a problem in some phase of vertebrate embryology. The course will be devoted in part to the mastery of the literature on the subject assigned.

802. Advanced Anatomy. Five credit hours. Winter Quarter. One conference and eight laboratory hours each week. Prerequisite, Anatomy 801. Mr. Landacre.

The continuance of the problem assigned in Anatomy 801. The student should familiarize himself with the material of his problem.

803. Advanced Anatomy. Five credit hours. Spring Quarter. One conference and eight laboratory hours each week. Prerequisite, Anatomy 801 and 802. Mr. Landacre.

The completion of the problem assigned in Anatomy 801 with the presentation of results.

804. Anatomical Problems. Five credit hours. Autumn Quarter. One lecture and eight laboratory hours each week. Prerequisite, two years of biological science, of which one must be in subjects listed in the Department of Anatomy. Mr. Landacre, Mr. Knouff, Mr. Baker.

The student will be assigned a problem in some subject in anatomy other than embryology. The course will be devoted in part to a survey of the literature on the subject assigned.

805. Anatomical Problems. Five credit hours. Winter Quarter. One lecture and eight laboratory hours each week. Prerequisite, two

years of biological science, of which one must be in subjects listed in the Department of Anatomy. Mr. Landacre, Mr. Knouff, Mr. Baker.

The student may continue a problem assigned in Anatomy 804 or may be assigned a new problem in some subject in anatomy other than embryology.

806. Anatomical Problems. Five credit hours. Spring Quarter. One lecture and eight laboratory hours each week. Prerequisite, two years of biological science, of which one must be in a subject listed in the Department of Anatomy. Mr. Landacre, Mr. Knouff, Mr. Baker.

The student may continue a problem assigned in Anatomy 804 or 805 or may be assigned a new problem.

ANCIENT ART

(See Greek Language and Literature)

ANIMAL HUSBANDRY

Office, Animal Husbandry Building

PROFESSORS GAY, PLUMB, KAYS, COFFEY, AND SALISBURY, MR. HEIZER, MR. SUTTON, MR. ROTH

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in animal husbandry in addition to any prerequisites stated in the description of the courses. Course 609 requires also an acceptable course in zoology.

601. Horse Production and Management. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Kays.

A consideration of breeding, feeding, and management of horses in the stud and at work; the horse as a power unit. The laboratory exercises include practice judging and management sessions which are planned with the problems of the horse breeder and the employer of horse labor in mind.

602. Beef Cattle Production and Management. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Gay.

A study of the management of beef breeding herds, both pure bred and commercial, and feeding for beef production; the selection and sources of breeding stock and feeder cattle; equipment and layout of feeding plants; systems of feeding and rations; fitting for show and sale. Inspection trips to pure bred herds and feed lots.

603. Swine Production and Management. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Coffey.

This course deals with the selection, feeding, and management of swine. In the laboratory work the judging of individuals and groups occupies a major portion of the time. At least two rather extensive trips for purposes of visiting herds over the State will be required in this course.

604. Dairy Cattle Production and Management. Five credit hours. One Quarter. Autumn and Winter. Three lectures and two two-hour laboratory periods each week. Mr. Salisbury.

A course dealing with the selection, breeding, and developing of dairy cattle, involving studies in the selection of the herd sire and herd matrons, together with problems encountered in the proper development of the growing animal. A study of the management of both commercial and pure bred herds from the standpoint of efficiency and health.

605. Sheep Production and Management. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Kays.

Text, supplemented by lectures, covers the breeding, feeding, wool production, and general management. The laboratory periods include practice in care and management of the flock on rather a wide basis, involving feeding, construction of equipment for the stables, treatment of diseases and parasites, butchering and cutting up the carcass, shearing, visiting the Ohio Sheep and Wool Growers' wool warehouse, judging, etc.

606. Advanced Live Stock Judging. Five credit hours. Autumn Quarter. Two four-hour and one two-hour laboratory periods each week. Prerequisite, Animal Husbandry 601, 602, 603, and 605. Mr. Kays.

An advanced class for Seniors who have had elementary work in judging and who desire additional judging experience. Type studies in case of horses, cattle, sheep, and swine, also practice judging in groups will occupy the time.

607. Meats and Meat Products. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Roth.

Composition, nutritive value and consumption studies of meat; instruction in meat selection and judging; slaughter of the more important classes and grades of live stock, a study of the resulting carcasses and their cost; wholesale cutting and retail price-fixing; meat specialties including curing and canning of meats; practice in displaying, wholesaling and retailing meats.

608. Live Stock Markets and Marketing. Five credit hours. Autumn Quarter. Five lectures each week. Mr. Roth.

The organization of livestock markets; presentation of viewpoints of the livestock producer, market representative, packer, and consumer; the history of existing livestock marketing agencies, their development and functions; livestock shipments; shrinkage; assignments based on specialized price study of commercial cattle, sheep, and hogs, including the classification and grading of feeder and slaughter live stock.

609. Breeding Live Stock. Five credit hours. Winter Quarter. Four lectures and one two-hour laboratory period each week. Mr. Gay.

The physiology of reproduction, growth, and development. Variation and heredity in their relation to live stock improvement; close breeding, cross breeding, and grading; prepotency, pedigree, and selection. Laboratory: study of the methods and achievements of the master breeders; reports and discussions of assignments covering current events and research in the field of live stock breeding.

611. Herd Book Study. Three credit hours. Winter Quarter. One lecture and two laboratory periods each week. Mr. Gay.

This course includes the organization of breed record associations, the constructions of herd, flock, and stud books, pedigree registration, and the study of pedigrees of animals of note.

612. Milk Production. Five credit hours. Autumn Quarter. Two lectures and two three-hour laboratory periods each week. Prerequisite, Animal Husbandry 604 and Bacteriology 607. Mr. Sutton.

A course dealing with the problems involved in the production of quality milk. The scoring of barns and farm milk houses. Methods employed in keeping low bacterial count and the handling of the product to insure proper condition at delivery to distributor. A study of milking machines will be a part of the laboratory work.

613. Extension Problems in Dairy Production. Five credit hours. Winter Quarter. Three lectures and one four-hour laboratory period each week. Mr. Salisbury.

A study of herd record systems and information necessary to the successful registra-

tion of dairy cattle. A study of health problems and agencies interested in eradication of disease. The formation of Herd Improvement Associations, Bull Associations, calf clubs, advanced record testing, breed development projects and other extension movements.

614. Dairy Cattle Seminar. Five credit hours. Spring Quarter. Three lectures and one four-hour laboratory period each week. Prerequisite, at least twenty hours in Dairy Production course and permission of instructor in charge. Mr. Salisbury, Mr. Heizer.

A course designed to cover the experimental work being pursued at the leading experiment stations and studies in experimental methods. Problems in breeding, feeding and management will be assigned.

616. Dairy Inspection Trip. Three credit hours. A two-weeks inspection trip to leading dairy cattle breeding establishments and commercial herds will be required of all students specializing in Dairy Production, to be taken immediately following the Spring Quarter of the Junior year. Mr. Salisbury.

Not open to students who have credit for Dairying 602.

701. Special Problems. Three to fifteen credit hours. Given in units of three or five hours a Quarter, for one or more Quarters. Autumn, Winter, Spring. Open to graduate students majoring in animal husbandry. Mr. Gay, Mr. Plumb, Mr. Kays, Mr. Coffey, Mr. Salisbury, Mr. Heizer, Mr. Sutton.

Special assignments in the advanced phases of any of the lines of animal and dairy production and meats.

NOTE: Students desiring work in animal nutrition, see Agricultural Chemistry 601, 607, 608.

FOR GRADUATES

Prerequisite for Graduate Work: As a prerequisite for a graduate major in this department the student must have had at least two years' study of the types and breeds of live stock, with collateral work in the principles of breeding, feeding, and management.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research Work. Three to fifteen credit hours, in units of three or five hours a Quarter, for one or more Quarters. Autumn, Winter, Spring. Mr. Gay, Mr. Plumb, Mr. Kays, Mr. Coffey, Mr. Salisbury.

Research problems in any of the lines of animal and dairy production and meats.

ART

(See Fine Arts)

ASTRONOMY

Office, Emerson McMillin Observatory

PROFESSOR MANSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

605. Introduction to Celestial Mechanics. Five credit hours. Winter Quarter. Prerequisite, calculus. Students electing Astronomy 605 are advised to take either before this course or concurrently with it a course in differential equations. Mr. Manson.

A discussion of rectilinear motion under the law of inverse squares and under the law of direct distance; central forces, including the character of the orbit under differ-

ent laws of attraction; the potential and attraction of bodies; the problem of two bodies, including the computation of positions of planets and comets.

606. **Introduction to Celestial Mechanics.** Five credit hours. Spring Quarter. Prerequisite, Astronomy 605 or equivalent. Mr. Manson.

A discussion of the determination of the orbits of planets and comets; the general integrals of the problems of "n" bodies and an introductory discussion of the problems of three bodies, lunar theory and perturbations.

*608. **Advanced Astronomy.** Three or five credit hours. Winter Quarter. Mr. Manson.

A continuation of Astronomy 507 or by special permission may be taken by students who have not taken Astronomy 507.

610. **Stellar Astronomy.** Five credit hours. Spring Quarter. The time is divided between lecture and laboratory periods as seems convenient. In Astronomy 610 the laboratory work will consist principally of computations. Prerequisite, the fundamental courses in astronomy and trigonometry. A knowledge of calculus is desirable but not essential. Students electing this course should have a liking for work that is mathematical in nature. Mr. Manson.

This course deals with that part of stellar astronomy which treats principally of stellar motions and distances. Such problems as determination of stellar distances, double stars, the solar motion and star streaming, will be discussed.

*611. **Minor Investigations.** Three to five credit hours. Reading, conference, and laboratory work. The instructor should be consulted regarding prerequisites. Ordinarily the prerequisite would be the completion of at least one of the other courses for advanced undergraduates and graduates. A student may repeat this course. Mr. Manson.

FOR GRADUATES

An undergraduate student shall not be permitted to take any courses in the "900" group except by permission of the Graduate Council.

900. **Astronomical Research at the Perkins Observatory.** Autumn, Winter, and Spring Quarters. Prerequisite, acceptable courses in astronomy, mathematics and physics. In accordance with an arrangement made by the Boards of Trustees of The Ohio State University and of Ohio Wesleyan University, students registered in the Graduate School may carry on their research work at the Perkins Observatory of Ohio Wesleyan University under the guidance of the Director of that Observatory. Subject of research to be chosen after consultation with the director. This course may be repeated as often as necessary in pursuit of any special research. (See page 13 for research facilities offered by the Perkins Observatory.) Mr. Stetson, with the cooperation of the staff of the Perkins Observatory.

* Not given in 1932-1933.

BACTERIOLOGY

Office, 210 Pharmacy and Bacteriology Building

PROFESSORS MORREY AND STARIN, ASSISTANT PROFESSORS SPEER AND MASTERS, MRS. HORTON, MR. WEISER, MR. DEEM

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in chemistry and the biological sciences in addition to any prerequisites stated in the description of the courses.

607. General Bacteriology. Five credit hours. One Quarter. Autumn, Winter, Spring. Two class periods and three three-hour laboratory periods each week. Mr. Morrey, Mrs. Masters, Mrs. Horton, Mr. Weiser.

This course is a prerequisite to all elective courses in the department and is designed to prepare for special work. The lectures consider the botanical relationships of bacteria, their morphology, classification, effect of physical and chemical environment, action on food material, etc. The laboratory work includes preparation of the ordinary culture media and making of cultures on these media, staining methods, and some typical biochemical actions.

608. Pathogenic Bacteria. Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

A study of the more important bacteria producing disease in man. Ways of transmission and methods of protection against infectious diseases. Sanitation and the theories of immunity.

609. Pathogenic Bacteria. Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mrs. Masters.

Laboratory work on the more important bacteria producing disease in man, including cultural and staining properties, methods of diagnosis, animal inoculation.

610. Dairy Bacteriology. Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Weiser.

Sources of bacteria in milk. Methods of avoiding them. Kinds of bacteria in milk. Abnormalities of milk and their prevention. Disease bacteria and milk. Uses of bacteria in butter making. Abnormalities of butter and their prevention. Uses of bacteria and fungi in cheese making. Abnormalities of cheese and their prevention. Bacteria in oleomargarine and ice cream.

611. Dairy Bacteriology. Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mr. Weiser.

Laboratory work on the organisms discussed in Bacteriology 610.

***612. Soil Bacteriology.** Three credit hours. Spring Quarter. Three class periods each week. Prerequisite, Bacteriology 607.

Source and kinds of bacteria in the soil. Bacteria in relation to the nitrogen problem, ammonification, nitrification, nitrogen absorption, denitrification. Bacteria in relation to sulphur, to carbon, to phosphorus. Bacteria and mineral salts. Soil fertility and bacteria. Disease bacteria of the soil.

* Not given in 1932-1933.

613. **Soil Bacteriology.** Three credit hours. Spring Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607.

Laboratory work on the organisms discussed in Bacteriology 612.

614. **Water Examination, Sewage Disposal, Water Filtration.** Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

A study of the organisms concerned in these processes. The modern water filtration and sewage disposal plants of the city of Columbus afford most excellent opportunities for practical demonstration and also for study of special problems.

615. **Water Examination, Sewage Disposal, Water Filtration.** Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

Laboratory work on the organisms discussed in Bacteriology 614.

*616. **Bacteriological Chemistry.** Three credit hours. Spring Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

Enzymes and the theory of their action. Technical uses of bacteria and fungi in the fermentation and allied industries. For laboratory work in connection with Bacteriology 616, see Bacteriology 620.

617. **Immunity and Serum Therapy.** Three credit hours. One Quarter. Autumn and Spring. Three class periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

A discussion of the general principles of immunity, including toxins and antitoxins, bactericidal substances, agglutinins, precipitins, opsonins, etc.

618. **Immunity and Serum Therapy.** Three credit hours. One Quarter. Autumn and Spring. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

Laboratory work in the preparation of toxins, antitoxins, antibacterial substances, bacterial vaccines, and in the serological methods of diagnosis.

619. **Pathogenic Protozoa.** Three credit hours. Spring Quarter. Three class periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

The various protozoal diseases are considered, with special attention to trypanosomiases, piroplasmoses, and spirochaetoses.

*620. **Bacteriological Chemistry.** Three credit hours. Spring Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

Laboratory work in connection with Bacteriology 616.

621-622-623. **Advanced Dairy Bacteriology.** Five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Bacteriology 607, 610, and 611. Mr. Weiser.

Research in any of the lines discussed in Bacteriology 610.

625-626. **Special Technique in Pathogenic Bacteriology.** Five credit hours. Autumn and Winter Quarters. Conferences, library, and labora-

* Not given in 1932-1933.

tory work. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

A course in technique in which the student is thoroughly trained in working with such material and methods as are encountered in board of health and hospital laboratories.

627. Special Problems in Pathogenic Bacteriology. Five credit hours. Spring Quarter. Conferences, library, and laboratory work. Prerequisite, Bacteriology 607, 608, 609, or equivalents. Mr. Starin.

628-629-*630. Advanced Soil Bacteriology. Five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Bacteriology 607, 612, and 613.

Research in any of the lines discussed in Bacteriology 612.

643-644-645. Applied Veterinary Bacteriology. Two credit hours. Autumn, Winter, and Spring Quarters. Six three-hour laboratory periods each week. Prerequisite, courses in general and pathogenic bacteriology. Mr. Speer, Mr. Deem.

A course in technic in which the student is given thorough training in diagnostic, preventive, and curative methods on material actually brought into the Veterinary Clinic.

701. Minor Investigations. Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Bacteriology 607, 608, 609 and either 617, 618, or 625-626 or equivalents. All instructors.

This course is designed for such students as have completed the equivalent of two years' work in bacteriology and are still undergraduates. The work will be outlined by the instructor in charge to meet the individual student's needs.

FOR GRADUATES

Prerequisite for Graduate Work: Students intending to specialize in bacteriology should take, in addition, courses in botany, pathology, anatomy, physiology, zoology, dairying, or soils (subject depends on the line of specialization) and a second year in chemistry, which should include organic chemistry, if possible.

As a prerequisite to each of the following courses the prospective student must have had at least two years' work in bacteriology, one of which must have been along the lines of the course selected.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research Work in Pathogenic Bacteriology. Five to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Morrey, Mr. Starin, Mr. Speer.

804-805-806. Research Work in Agricultural or in Technical Bacteriology. Five to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Morrey.

* Not given in 1932-1933.

BIBLIOGRAPHY

Office, The Library

ASSOCIATE PROFESSOR JONES

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601-602-603. History of Book-Making. Two credit hours. Autumn, Winter, and Spring Quarters. Two class periods each week. Miss Jones.

Principal topics: clay tablets; manuscripts; paper making; incunabula; book binding; copyright; book publishing; newspaper publishing; book selling; book illustration and the history of printing.

BOTANY

Office, 102 Botany and Zoology Building

PROFESSORS TRANSEAU, SCHAFFNER (RESEARCH), STOVER, AND SAMPSON, ASSOCIATE PROFESSORS WALLER AND TIFFANY, ASSISTANT PROFESSOR MEYER, MISS LAMPE, MR. HUMPHREY, MR. CAMP, MR. BLAYDES, MR. GORDON, MR. FREELAND

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in botany and biological science in addition to any prerequisites stated in the description of the courses. Course 617 requires also a course in plant physiology; 651, 655, and 657, a course in plant pathology; 635, a course in heredity.

601. Plant Ecology. Five credit hours. Autumn Quarter. Three lectures and one four-hour laboratory period each week. Mr. Transeau, Mr. Gordon.

Lectures on the vegetation of the Eastern United States with special reference to the plant associations and formations of Ohio. Field work on the associations of the vicinity of Columbus and their successions. Reading of important literature.

602. Plant Ecology. Five credit hours. Spring Quarter. Three lectures and one four-hour laboratory period each week. Prerequisite, Botany 601. Mr. Transeau, Mr. Gordon.

General principles of ecological plant geography. A discussion of associations and successions of the major divisions of the vegetation of North America. Assigned readings of the more important literature. Several Saturday field trips.

605. Plant Physiology. Five credit hours. One Quarter. Autumn and Winter. Three lectures and two two-hour laboratory periods each week. Mr. Transeau, Mr. Meyer, Mr. Freeland.

The physiology of absorption and movement of water, salts, and gases in plants. The properties of water, solutions, and colloids; permeability, diffusion, absorption, transpiration, and the movement of water in plants.

Not open to students who have credit for Botany 415.

606. Plant Physiology. Five credit hours. One Quarter. Winter and Spring. Three lectures and two two-hour laboratory periods each week. Prerequisite, Botany 605. Mr. Meyer, Mr. Freeland.

The physiology of nutrition, growth and movement; photosynthesis, other syntheses, enzymes, digestion, translocation, accumulation, assimilation, respiration, fermentation, growth, and movement.

Not open to students who have credit for Botany 416.

607. Principles of Taxonomy: Pteridophytes and Gymnosperms. Five credit hours. Autumn Quarter. Two lectures and six laboratory hours each week. Mr. Schaffner.

A detailed study of phylogeny and evolutionary series based on floral structure and organography.

608. Principles of Taxonomy: Monocotyls. Five credit hours. Winter Quarter. Two lectures and six laboratory hours each week. Prerequisite, Botany 607. Mr. Schaffner.

A study of the groups of monocotyls with special consideration of the taxonomy of the grasses and of the lack of correlation between taxonomic characters and environment.

609. Principles of Taxonomy: Dicotyls. Five credit hours. Spring Quarter. Two lectures and six laboratory hours each week. Prerequisite, Botany 608. Mr. Schaffner.

A general consideration of all the groups of dicotyls, of the origin of angiosperms, and of the progressive or serial development of characters.

611. Evolution of Plants. Five credit hours. Spring Quarter. Lectures and assigned readings. Prerequisite, four Quarters of Botany. Mr. Schaffner.

The progress of evolution in the plant kingdom with a general discussion of the problems and factors involved, including both the scientific and philosophical aspects of the subject.

613. General Morphology of Thallophytes and Bryophytes. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Blaydes.

A study of the classification and life histories of the algae, fungi, liverworts, and mosses. The laboratory work will consist of a study of the vegetative and reproductive structures of the several groups.

Not open to students who have credit for Botany 409.

614. General Morphology of the Pteridophytes and Spermatophytes. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Miss Lampe.

A study of the comparative structures and life histories of the ferns, gymnosperms, and angiosperms, giving particular attention to the structure and development of seed plants.

Not open to students who have credit for Botany 410.

615. Plant Microtechnic. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Blaydes.

Principles and methods of killing, fixing, imbedding, sectioning, staining, and mounting plant materials for microscopic study.

Not open to students who have credit for Botany 421.

617. Plant Microchemistry. Five credit hours. Autumn Quarter. One lecture and three two-hour laboratory periods each week. Prerequisite, Botany 605-606. Desirable antecedents, general inorganic and organic chemistry. Mr. Sampson, Miss Lampe.

The identification *in situ* of organic and inorganic substances found in plant tissues by microchemical methods. These methods are of special value in determining plant substances within the cells and in the study of physical and chemical changes accompanying plant processes and plant responses. This applies particularly to the numerous local regions in plants too small to be attacked by the test-tube method of tissue analysis.

619. Economic Botany. Five credit hours. Autumn Quarter. Four lectures and one two-hour laboratory period each week. Desirable antecedents, commercial geography and plant ecology. Mr. Waller.

The world's food resources are examined in the light of botanical problems involving geographic distribution of economic plants. A summary is made of the centers of production of food-producing plants and the relation of these centers to natural plant formations is discussed. Trips to various industrial concerns utilizing plant materials are combined with laboratory examination of plant products.

620. Economic Botany. Five credit hours. Winter Quarter. Four lectures and one two-hour laboratory period each week. Desirable antecedents, commercial geography and plant ecology. Mr. Waller.

The fiber and oil producing plants and the forest products are discussed in this course. The same ecological and economic principles discussed in the previous course are applied, and an analysis is made of trade relations of the products to natural environmental factors governing the distribution of the plants. Visits are made to the industrial establishments using the materials discussed.

632. Physiological Methods. Three credit hours. Spring Quarter. Six hours of laboratory work each week. Prerequisite or concurrent, Botany 605-606, except by special permission of the instructor. Mr. Meyer.

Methods of measuring the physical factors of the environment that influence plant growth and development both under laboratory and field conditions. Methods of growing plants under controlled conditions for experimental work. Conferences, readings, and laboratory work.

633. Physiological Methods. Three credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite or concurrent, Botany 605-606, except by special permission of the instructor. Mr. Meyer.

A laboratory course in the methods of plant physiology such as measurements of H-ion concentration, osmotic values, permeability, enzyme activity and the processes of transpiration, respiration and photosynthesis. Conferences, readings and laboratory work.

634. Plant Growth. Three credit hours. Spring Quarter. Three lectures each week. Consult instructor before registering. Mr. Sampson.

A study of the physiology of growth. Special attention is given to the interrelated effects of internal and external factors upon growth, movement and reproduction in plants. Bibliographies and reviews of literature.

635. Plant Genetics. Five credit hours. Spring Quarter. Five recitations each week. Mr. Waller.

The study of heredity in plants. Theories of the transmission of heritable characteristics. Research methods in the study of inheritance.

***637. Plant Cytology.** Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, four Quarters of Botany. Desirable antecedents, Botany 614 and a course in plant microtechnic. Given biennially, alternating with Botany 640. Miss Lampe.

The structure, ontogeny, divisions and fusions of plant cells.

640. Plant Anatomy. Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. Given biennially, alternating with Botany 637. Mr. Camp.

The origin and development of the organs, and tissue systems of vascular plants,

* Not given in 1932-1933.

and comparative study of the structures of roots, stems, leaves, flowers, and fruits. This course is a desirable antecedent to advanced work in physiology and pathology.

651. Experimental Plant Pathology. Three credit hours. Spring Quarter. One lecture and two three-hour laboratory periods each week. Prerequisite, an acceptable course in general plant pathology; desirable antecedent, Bacteriology 607. Mr. Stover, Mr. Humphrey.

A number of bacterial, fungous and virus diseases of plants are studied experimentally in the laboratory and greenhouse. The methods employed in research on plant diseases are emphasized. These include the preparation of culture media, the isolation and culture of organisms causing plant diseases, methods of inoculation, and sectioning and staining diseased tissues.

653. Mycology. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Stover.

The identification of the fungi of woods and fields, including a number of edible and poisonous mushrooms, wood-destroying fungi, and other important forms. The characteristic structures and life histories within each of the great groups are emphasized.

655. Diseases of Fruit Crops. Three credit hours. Autumn Quarter. Three two-hour laboratory periods each week. Mr. Stover.

A study of the field, transportational and storage diseases of orchard and small fruits with especial reference to the cause, symptoms, life history of the causal organism in relation to disease, and control measures.

657. Diseases of Garden Crops. Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. Mr. Stover.

The diseases of the more important garden and truck crops are studied on the general plan followed in Botany 655. Attention is given also to the relation of various cultural practices to the occurrence of certain diseases.

665-666. Freshwater Algae. Five credit hours. Winter and Spring Quarters. Prerequisite, six Quarters of biological work and consent of the instructor. Given biennially. Mr. Tiffany.

Conference, laboratory, and library course on the classification, morphology, and ecological relations of the freshwater algae.

701. Special Problems: Taxonomy, Morphology, Cytology, and Anatomy. Two or five credit hours each Quarter. Autumn, Winter, Spring. Mr. Schaffner, Mr. Transeau, Mr. Stover, Mr. Tiffany, Miss Lampe, Mr. Blaydes, Mr. Camp.

703. Special Problems: Physiology and Ecology. Two or five credit hours each Quarter. Autumn, Winter, Spring. Mr. Transeau, Mr. Sampson, Mr. Waller, Mr. Tiffany, Mr. Meyer.

704. Special Problems: Pathology and Mycology. Two or five credit hours each Quarter. Autumn, Winter, Spring. Mr. Stover, Mr. Humphrey.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 705.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate students should have had a thorough preparation in general botany, plant physiology, and plant morphology. Students majoring in plant pathology should have had acceptable courses in microchemistry, bacteriology, and plant genetics, in addition to the undergraduate courses in pathology. Advanced work in plant physiology presupposes at least an elementary course in organic chemistry.

With plant physiology, suitable courses may be elected in physical, organic and plant chemistry, and in soil investigations. With plant pathology, various courses in entomology and bacteriology are available.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Taxonomy and Morphology. Three to ten credit hours. Autumn, Winter, and Spring Quarters. Laboratory open daily. Mr. Schaffner, Mr. Transeau, Mr. Stover, Mr. Tiffany, Miss Lampe.

803. Research in Physiology and Ecology. Four to ten credit hours. Autumn, Winter, and Spring Quarters. Laboratory open daily. Mr. Transeau, Mr. Sampson, Mr. Waller, Mr. Tiffany, Mr. Meyer.

804. Research in Mycology and Plant Pathology. Four to ten credit hours. Autumn, Winter, and Spring Quarters. Laboratory open daily. Mr. Stover.

805. Research in Genetics. Four to ten credit hours. Autumn, Winter, and Spring Quarters. Laboratory open daily. Mr. Schaffner, Mr. Waller.

806. Research in Economic Botany. Four to ten credit hours. Autumn, Winter, and Spring Quarters. Laboratory open daily. Mr. Waller.

810. Botanical Seminary. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in botany. All instructors.

812. Seminary in the History of Botany. One credit hour. Winter Quarter. Recommended for all graduate students majoring in botany. Mr. Waller.

BUREAU OF EDUCATIONAL RESEARCH

Office, 201 Education Building

PROFESSORS CHARTERS, HOLY, AND TYLER, ASSOCIATE PROFESSOR ANDERSON, ASSISTANT PROFESSORS COWLEY AND DALE, MR. LUMLEY, MISS McLATCHY

The purpose of the Bureau of Educational Research is to promote the scientific investigation of educational problems both at the University and in the public schools of the State. It constitutes an agency for cooperative effort among all the school people of Ohio. The facilities of the Bureau are available to all students, faculty members, and school people of Ohio.

Library. The research library contains large quantities of material in the form of manuscripts, pamphlets, bulletins, reports, modern textbooks for elementary and high-school grades, and educational periodicals. This library is in charge of a reference librarian, and her services together with the library material will be utilized in the preparation of bibliographies and reports on problems presented by those engaged in educational work. This applies to students and faculty members as well as those engaged in the work of the public schools. Unless the problem requires extensive investigation, this service will be rendered gratis.

Courses. In order to make the resources of the Bureau serve for research purposes, students desiring to work in the Bureau may register in certain courses listed in the departments of School Administration, Psychology, Principles and Practice of Education, and Practical Arts and Vocational Education. Courses must be approved by the chairman of the particular department and by the Director of the Bureau. Such students will be under the direction and supervision of the Bureau staff members.

Research Problems. Students taking such courses will be given a practical problem upon which to work. There will be no regular recitation periods, but the student will be in a position to confer with the Bureau staff whenever advisable. According to the nature and exacting character of the problem and the scholastic status of the student, he may be registered in either of two groups of courses, as follows:

MINOR PROBLEMS. Two to four credit hours. Investigation of minor problems.
Psychology 650
Principles and Practice of Education 651
School Administration 618
Practical Arts and Vocational Education 650-651-652

MAJOR PROBLEMS. Three or more credit hours. Investigation of problems leading to preparation of theses for advanced degrees.
Psychology 801
Principles and Practice of Education 851
School Administration 805, 806, and 807
Practical Arts and Vocational Education 801-802-803 and 804

NOTE: Descriptions of these courses will be found under the department announcements.

BUREAU OF SPECIAL EDUCATION

Office, 321 Education Building

PROFESSOR BERRY

The function of the Bureau of Special Education is to promote the education of all types of exceptional children (the handicapped and the gifted) through field service, teacher training, and research.

Students interested in the work of this Bureau should confer with the Director.

Field Service. The objectives of field service are: to assist the smaller communities in organizing the work of special education; to serve in an advisory capacity the communities in which special education has already been organized; and to cooperate with state and local organizations in formulating a state program for the protection, treatment, and training of all types of exceptional children and for the removal of the causes that handicap children.

Teacher Training. No person should prepare to teach exceptional children who has not had successful experience in teaching normal children.

For graduate students who wish to prepare to teach children who are behavior problems, mentally retarded, or defective in speech, the following courses are recommended:

For those preparing to teach the mentally retarded:
Psychology 609, 611, 613, 616
Principles of Education 654, 656
School Administration 674, 836

For those preparing to teach behavior problem children:
Psychology 609, 616, 622, 634, 641
Sociology 625
School Administration 675
Principles of Education 655, 656

For those preparing to teach the defective in speech:
Psychology 609, 616
Phonetics 630, 635, 640
School Administration 660
Principles of Education 656

Research. Students interested in research problems connected with the work of the Bureau of Special Education should register in either of the following two groups of courses:

MINOR PROBLEMS. Two to four credit hours. Investigation of minor problems.
Psychology 650
Principles of Education 651
School Administration 618
Practical Arts and Vocational Education 650-651-652.

MAJOR PROBLEMS. Three or more credit hours. Investigation of problems leading to preparation of theses for advanced degrees.
Psychology 801
Principles of Education 851
School Administration 805, 806, and 807
Practical Arts and Vocational Education 801-802-803 and 804.

NOTE: Descriptions of these courses will be found under the department announcements.

BUSINESS ORGANIZATION

Office, 107 Commerce Building

PROFESSORS MAYNARD, WEIDLER, HOAGLAND, DICE, HELD, WISSLER, AND DUFFUS, ASSOCIATE PROFESSORS PIKE, REEDER, CORDELL, BECKMAN, AND DAVIS, ASSISTANT PROFESSORS THOMPSON, POWER, AND DAMERON, MR. C. W. BOWERS, MR. DONALDSON, MR. RIDDLE, MR. CHUTE, MR. HAROLD, MR. ROBERTS, MR. ODEBRECHT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: A fundamental course in economics in addition to any prerequisites stated in the description of the courses.

604-*605. Business Communications and Adjustment Practice. Three credit hours. Two Quarters. 604, Autumn, Winter, Spring; 605, Winter. Mr. Held, Mr. Roberts.

The principles of effective writing: the requirements of a satisfactory business letter, application for positions; credit, collection, sales and promotion correspondence; form letters and form paragraphs. An historical treatment of claims and complaints. Analysis of the present problem of adjustments in such fields as wholesaling, retailing, mail order business, etc. Current method of handling adjustments, by personal conference and correspondence. Administration of adjustments through a separate department and association with collections or other departments.

* Not given in 1932-1933.

*606. **Administrative Secretarial Duties.** Three credit hours. Winter Quarter. Prerequisite, permission of the instructor. Mr. Held.

An office of executive nature has developed in recent years requiring special training for such organizations as Chambers of Commerce, Trade Associations, Merchants' and Manufacturers' Associations, and the like. This course considers the duties and problems of such executives and analyzes the office needs. Among the specific subjects taken up are: office supervision, correspondence, conventions, committees and programs.

614. **Business Statistics.** Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, courses in economic statistics and college algebra. Mr. Dewey.

A study of price and production index numbers. Correlation of business and economic data as applied to business forecasting. Analysis of business and economic data for cyclical and other major movements. Each student, so far as possible, will be assigned problems of interest in his particular field of study.

616. **Business Statistics.** Three credit hours. Spring Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Business Organization 614. Mr. Dewey.

This course is a continuation of Business Organization 614. Further consideration of correlation. The theory of probabilities and sampling. An analysis of the methods and technique of business forecasting. Reference to the leading business services now forecasting business conditions. A discussion of the nature of statistical results. Laboratory exercises will be assigned largely as the needs of each student dictate.

621. **Business Law: Contracts.** Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Power, Mr. Bowers.

A course in the law of contracts for the student of business. A study of the fundamentals of legally binding agreements between persons, and their enforcement; including a study of the making of the contract, consideration, the effect of fraud, duress, undue influence, mistake, illegality, and the statute of frauds, interpretation, discharge, and remedies.

622. **Business Law for Engineers and Architects.** Three credit hours. One Quarter. Autumn and Spring. Mr. Power.

A course in the law of contracts with special reference to engineering and architectural problems and with incidental reference to certain other phases of the law that most closely affect the engineer and architect.

623. **Business Law: Agency and Sales.** Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 621. Mr. Pike, Mr. Bowers.

A course in the law of agency and sales for the student of business. The fundamentals of the law governing business transactions of persons through agents and the sale of personal property. A continuation of Business Organization 621.

625. **Business Law: Negotiable Instruments.** Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 621. Mr. Bowers.

A course in the laws governing bills of exchange, promissory notes and checks designed to guide the business man in his daily transactions with such instruments.

627. **Business Law: Partnerships and Corporations.** Three credit hours. One Quarter. Autumn and Winter. Prerequisite, Business Or-

* Not given in 1932-1933.

ganization 621; preferably preceded by Business Organization 623. Mr. Pike.

A course designed to give the student of business a practical working knowledge of important laws governing the formation and operation of partnerships and corporations.

629. Business Law: Legal Aspects of Credits and Collections. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Business Organization 621. Mr. Pike.

The work includes in part a study of instruments of credit, forms of security, the pledge, real estate mortgage, chattel mortgage, conditional sale, laws governing their execution and priorities; legal instruments of collection, judgments, executions, judgment liens, mechanics and material men's liens; assignments for creditors, transfers in fraud of creditors, receiverships, bankruptcy, laws of Ohio governing the execution and priorities of the various liens and other subjects mentioned.

*631. Business Law: The Law of Banks and Banking. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Business Organization 621 and 625. Mr. Pike.

The work includes in part a study of the laws governing the bank and the borrower, the bank and the depositor, the bank and its customer; trusts, their creation and management, wills, estates, and probate practice, property and conveyancing, suretyship, statutes governing creation and operation of banks and trust companies, bank failures, stockholders, legal aspects of collateral security contracts and the sale of stocks and bonds, bankruptcy, etc.

640. Corporate Organization and Control. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Mr. Donaldson.

Types of business enterprise; the corporation; incorporation costs and procedure; taxes; foreign corporations; stockholders' and directors' meetings; rights, duties, obligations, and liabilities of stockholders, directors, and officers; intercorporate relations; legislation and court decisions affecting the organization and control of business corporations.

642-643. Real Estate Principles and Finance. Three credit hours. Two Quarters. 642, Autumn and Spring; 643, Winter. Three hours lecture and quiz each week. Prerequisite to 642, ten hours in the principles of economics. Prerequisite to 643, Business Organization 642. Business Organization 642 may be taken separately. Mr. Hoagland.

The first Quarter's work constitutes a survey course covering the general field of the real estate business.

The second Quarter deals with problems of real estate appraisals and finance.

The content of each Quarter is intended to be of practical use to the purchaser, seller or occupant of real estate as well as to the one who intends to engage in the real estate business.

644. Real Estate Problems. One to three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, permission of instructor. Mr. Hoagland.

Individual research in the field of real estate, designed for students primarily interested in real estate investments and in possibilities of the real estate business.

645. Trade Associations. Three credit hours. Winter Quarter. Three recitations each week. Mr. Hoagland, Mr. Duffus.

Nature and purposes of trade associations; historical evolution; types; organization (single associations, multiple secretaryships, federated associations, federations of

* Not given in 1932-1933.

associations); branches; methods of financing; functions (commercial, industrial, technical, statistical, protective, etc.); meetings; administration (qualifications of secretary, procedure, etc.); relations with labor, other industries, governmental agencies, etc.; Federal Trade Commission; laws and court decisions affecting trade associations.

650. Corporation Finance. Five credit hours. One Quarter. Autumn, Winter, Spring. Two lectures and three quiz periods each week. Mr. Hoagland, Mr. Duffus, Mr. Donaldson, Mr. Riddle, Mr. Harold.

Financial structure and problems of modern business corporations; common types of securities; promotion, including parts played by promoter, investment banker and his organization, syndicate, security dealer; determination, management, and distribution of surplus; financial problems of expansion, including changes in financial plans; securing funds for expansion; failure of corporations and resulting reorganization or liquidation; financial results of reorganization.

Not open to students who have credit for or are taking Economics 616.

652. Industrial Finance. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Business Organization 650. Mr. Hoagland.

Obtaining funds for capital accounts; capitalization and valuation; factors governing financial plan; functions and methods of banking houses in financial corporations; syndicate operations; joint accounts, underwriting; wholesaler and retailer; security markets; working capital from banks, open markets, trade acceptance, miscellaneous sources; financial plan and purchasing, production, selling policies; subsidiaries; assumed obligations; financing mergers and consolidations; ammortization; readjustments of capital account.

653. Industrial Consolidations and Mergers. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Business Organization 640 or 650. Mr. Hoagland, Mr. Duffus.

The development of industrial consolidations and mergers in the United States and abroad, with particular emphasis upon the period since the World War; causes; types; tendencies; influence upon production, prices, profits; large scale management distinguished from large scale production; resultant financial and administrative problems for business executives; case study of typical industries affected by the consolidation movement; present day consolidations and mergers contrasted with the "trusts" of the past.

656. Railroad and Public Utility Finance. Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, Business Organization 650. Mr. Duffus.

Financial problems peculiar to public utilities and railroads. Basis of investment; promotion; construction finance; supplementary capitalization; financing equipment; financial management; control of surplus; finance and accounts; intercorporate relationships; consolidations; collateral issues; pyramiding of capitalization; public utility holding company; insolvency; receivership; reorganization; financial problems of non-operating property; government regulation of security issues; government partnership; financial problems of government ownership and operation.

657. Investment Analysis. Three credit hours. Winter Quarter. Prerequisite, Business Organization 650. Mr. Riddle, Mr. Donaldson.

A course in which investment problems with specific corporations will be analyzed and compared.

658. Principles of Investment. Three credit hours. One Quarter. Autumn and Spring. Three hours of recitations and problem discussion each week. Prerequisite, Economics 616 or Business Organization 650. Mr. Hoagland, Mr. Donaldson, Mr. Riddle.

A consideration of the principles governing the selection of investment channels and investment securities from the point of view of the investor.

659. Investment Banking. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Business Organization 650. Mr. Hoagland, Mr. Riddle.

A consideration of the functions and operations of investment bankers in the distribution of securities.

660. The Stock Market. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Prerequisite, Business Organization 650 and a course in money and banking. Mr. Dice.

The organization of the stock market; its relation with the banking community and with the public; the work of brokerage houses; the methods of speculation; public regulation of the exchanges; the movement of stock prices; business cycles in their relation to speculation and investment; the forecasting of stock market conditions.

662. The Money Market. Three credit hours. Spring Quarter. Prerequisite, a course in money and banking. Mr. Dice.

A study of the development of New York as the money center of the United States; the work of the note broker; the commercial paper house; relation of the commercial paper house to the Federal Reserve System; interest and discount rates; movements of money. The significance of the money market to business; to the security market, and to foreign exchange; a consideration of the factors that promote the development of a world money market.

665. Foreign Exchange. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, a course in money and banking. Mr. Willit.

A study of the theory and practice of foreign exchange; the supply and demand for exchange; rates of exchange; exchange quotations; commercial and bankers' bills; dollar credits; the development of a foreign exchange market; the organization and management of the foreign exchange department of a bank; the relation of the foreign exchange department to business; foreign exchange in relation to public policies.

666-667-668. Practice Work in Banking. One to three credit hours. Autumn, Winter, and Spring Quarters. Students are admitted on the suggestion of the instructor in charge in cooperation with the banks concerned. Mr. Dice.

Students taking this course will be engaged in actual work in a bank under the supervision of the head of the banking group. Each student will attend conferences in regard to his work and make reports based on the actual operations in the bank with which he is connected.

670-*671. Bank Organization and Management. Three credit hours. Winter and Spring Quarters. Two discussion periods each week during the Winter Quarter and three discussion periods each week during the Spring Quarter. Each Quarter may be taken separately. Prerequisite, a course in money and banking, Business Organization 650, and Accounting 616 (for 671). Mr. Dice.

A study of the formation of banking institutions; organization of the different departments of a bank; new business; the clearing system; the bank's reserves; the management of the bank's investments; the theory of bank liquidity; the work of the loan and discount committee; the bank credit investigator; bank credit policies; methods of diversification of loans; buying commercial paper; collateral loans; the distribution of the bank's funds to meet seasonal and cyclical fluctuations in business.

* Not given in 1932-1933.

674. Savings and Trust Functions. Three credit hours. Autumn Quarter. Three lecture and discussion periods each week. Prerequisite, a course in money and banking. Mr. Willit.

The savings institutions studied include building and loan associations, various types of savings banks, credit unions, and savings departments of commercial banks. A study of the operations and functions of trust companies and trust departments of banks constitutes the work of the second half of the course.

***678. Plant Site and Layout.** Three credit hours. Autumn Quarter. Prerequisite, Business Organization 680; preferably preceded by Geography 603. Mr. Thompson.

The content of this course concerns itself with the location and layout of the individual plant. In the organization and management of a manufacturing type of industry, plant site and layout covers site as related to real estate and zoning, proximity to labor supply, access to transportation facilities, etc. Plant layout, dealing with the internal disposition of the plant, treats of location of production centers, storerooms, control mechanisms, etc. The emphasis in content and method is upon occasions, problems and procedures as they affect organization and management.

680. Industrial Organization and Management. Five credit hours. One Quarter. Autumn, Winter, Spring. Three lectures and two conferences each week. Mr. Davis, Mr. Thompson, Mr. Chute.

The history, literature, organization, and management of industry and the theory of industrial management. The fundamental business applications of the principles developed are emphasized.

Kinds and internal development of organization, dealing particularly with problems of interrelation of functions and the purpose and nature of functions operating in the several fields of industrial management, e.g., production, material, and personnel, are presented without detailed study of specific problems.

684. Industrial Management Field Work. Three to six credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 680. Mr. Thompson, Mr. Chute.

Field work. This work should be a regular, productive job in an industry. The job must carry the approval of the instructor and be followed by a report both from the employer and the student.

685. Material Organization and Management. Three credit hours. One Quarter. Autumn and Winter. Two lectures and one conference each week. Prerequisite, Business Organization 680. Mr. Wissler.

The organization and management of the problem of materials in industries. A study of the organization and functions of the purchasing, stores, stores controlling departments and that part of the planning, accounting, production, and other departments which directly affect the control of materials. The problems involved and accepted methods of handling and moving materials.

Students will be required to do field work involving visits and inspection of industries and to write constructive reports and a term thesis.

686. Personnel Organization and Management. Three credit hours. One Quarter. Autumn and Spring. Two lectures and one conference each week. Prerequisite, Business Organization 680. Mr. Wissler, Mr. Thompson.

The organization and management of the employment department and the personnel problems within an industry. This course deals particularly with the functions and problems which come within the scope of employment manager, such as, hiring, force maintenance, industrial education and welfare. It does not deal with questions of labor

* Not given in 1932-1933.

organization except in so far as is necessary for proper conception of these problems within an industry.

Students will be required to do field work involving visits and inspection of industries and to write constructive reports and a term thesis.

687. Production Organization and Management. Three credit hours. One Quarter. Winter and Spring. Three lectures and one conference hour each week. Prerequisite, Business Organization 680. Mr. Davis.

The problems of organization and management incident to the successful control of production in industry. Treats these problems largely from the point of view of a production manager. Coordinates personnel, equipment, and material to produce the necessary justification of organization in maximum production at least cost.

691. Office Organization and Management. Three credit hours. Spring Quarter. Two lectures and one conference each week. Mr. Wissler.

Administration of offices. Methods of pay. Office manager. Standards, tools, forms, equipment, office machinery. Standard methods. Files, ticklers, mail handling, dictation, messengers. Engineering features. Special office problems of different departments.

695-696-697. Problems in Labor Management and Industrial Organization and Management. One to three credit hours. Autumn, Winter, and Spring Quarters. Two conferences each week. Prerequisite, consent of the instructor. Mr. Wissler, Mr. Davis, Mr. Thompson.

The course is intended to give the student who is interested in a particular problem in employment or industrial management an opportunity to make an intensive study of the problem. The subjects for investigation must be approved by the instructor.

700. Marketing. Five credit hours. One Quarter. Autumn, Winter, Spring. Five hours lecture and quiz each week. Mr. Beckman, Mr. Reeder, Mr. Cordell, Mr. Dameron.

A general survey of the field of marketing. Critical consideration of functions, policies and institutions in the marketing of agricultural products, raw materials and manufactured goods.

A study of consumers' buying motives and demand and the marketing machinery which serves them. Functions, methods, costs of marketing and marketing problems of the farmer and manufacturer, wholesaler, jobber, commission merchant, selling agent, broker, factor, retailers of various types and other middlemen. Special attention given to principles, trends and policies in their relation to marketing efficiency.

702. Marketing Problems and Market Analysis. Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Cordell.

A consideration of the marketing problems of manufacturers, jobbers, selling agents, commission merchants, factors, brokers, agents, and retailers. Market analysis will be considered with reference to sources of information, procedure, and the use of the results of such analyses in determining distribution policies and methods.

705. Retail Merchandising. Four credit hours. One quarter. Autumn, Winter, Spring. Four lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Maynard.

A consideration of the organization and management of retail establishments: store location; store organization; buying; receiving; stockkeeping; inventories; sales systems; store policies; services; expenses and profits; deliveries; personnel problems, etc.

706. Wholesaling. Four credit hours. Spring Quarter. Four lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Beckman.

The wholesaler as a link in the chain of distribution, classes of wholesalers, tend-

encies in wholesaling, wholesale centers, radii of operation, the organization and management of wholesale establishments. Location, organization, stock control, purchasing, receiving, pricing, inventories and stock records, sales systems and organizations, handling orders, shipping, credits and collections, house policies, dealer helps and other services, expenses, profits, etc.

709. Credits and Collections. Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Beckman, Mr. Cordell.

The nature and functions of credit. Forms of credit instruments; retail, mercantile, and instalment credit; the credit risk. Sources of credit information; mercantile agencies; credit interchange bureaus; etc. Credit department organization and management. Collection methods and policies; collection agencies and attorneys. Legal safeguards; extensions; compositions; adjustments; adjustment bureaus; receivership; bankruptcy. Credit insurance; credit limits; credit and collection control.

712. Salesmanship and Sales Management. Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Maynard, Mr. Odebrecht.

The first part of the course covers the following topics: knowledge of goods; prospecting; study of customers and their wants; buying motives; planning a sale; attitude of buyers; conducting a sales talk; meeting objections; closing the sale; cultivation of personality.

The second part of the course is devoted to a consideration of problems in sales management, sales organization, sales planning and research, sales policies, sales methods, selecting and training salesmen, territories and quotas, compensation of salesmen, stimulation of salesmen, supervision of salesmen.

716. Principles of Advertising. Three credit hours. One Quarter. Autumn, Winter, Spring. Three lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Maynard, Mr. Dameron.

A survey study of advertising as an instrument of modern business. The relation of advertising to the marketing process and to general business. Advertising to the consumer. The purpose of advertising. Advertising copy, layout, and typography. Visualization. Advertising research. The advertising organization. Campaigns. Media. Appeals. Trade-marks. Industrial advertising. The economics of advertising. The viewpoint of the enterpriser is emphasized.

717. Advertising Practice. Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Business Organization 716. It is recommended that this course be preceded by Psychology 635. Mr. Dameron.

This course offers opportunity for the further application of the principles of advertising to the advertising of selected products. The marketing factors of the problem are first considered followed with the actual preparation of the advertisement or campaign. The principles of copy and layout are stressed involving such related problems as selection of media, determination and presentation of appeals, space and position requirements, typography, the use of art and illustration (reproductive processes), effective copy-writing and dynamic layouts. The problem material emphasizes consumer advertising in the more general markets.

719. Retail Advertising. Four credit hours. Spring Quarter. Two recitations, one two-hour laboratory period and one conference each week. Prerequisite, Business Organization 717 or the permission of the instructor. Mr. Dameron.

Retail advertising, sales promotion and store publicity developed from the viewpoint of the store and the seller of space. Consideration is given to consumer demand, the

appropriation, copy, media, appeals, layout, the retail advertising department. How to buy advertising, cooperating with the newspapers, the newspaper's merchandising department. Attention is given to advertising as conditioned by the type of store and type of product.

In the laboratory, the student works on actual problems of store advertising.

720-721. Exporting and Importing. Three credit hours. Autumn and Winter Quarters. 720 is given in the Autumn Quarter, and 721 in the Winter Quarter. Three hours lecture and quiz each week. Preferably preceded or accompanied by Business Organization 700, and a course in money and banking. Mr. Held.

Methods of conducting export and import business; foreign trade correspondence and advertising; market analysis; export commission houses and other sales agencies; handling shipments; credits and collections.

725. Field Work in Marketing. Three to six credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 700. Open to students in the Marketing group only. Mr. Maynard, Mr. Beckman.

Before entering upon the fourth year of residence, an opportunity will be given to a limited number of students who have demonstrated their ability, to do one Quarter's work in business under the supervision of the instructional staff. The work will probably carry pay and must be a regular production position in the field of distribution. The position must have the approval of the instructor and a report will be made by both the student and the employer.

726-727-728. Thesis in Marketing and Advertising. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, permission of the instructor. Mr. Weidler, Mr. Maynard, Mr. Beckman, Mr. Cordell, Mr. Dameron.

Individual and group research in the fields of marketing, merchandising, advertising and sales. This course is designed to give training in research and to offer an opportunity to students for investigation of the problem or problems of their future field of work.

740. Public Utility Organization and Administration. Three credit hours. Spring Quarter. Three lecture and discussion periods each week. Prerequisite, Economics 618 or 648. Mr. Power.

The public utility as a business enterprise; its organization as an individual proprietorship, partnership, corporation or holding company. The problems of administration confronting each type of organization. Legislative, judicial and administrative control of public utilities and their effect upon the management of the industry.

745. Ocean Transportation. Three credit hours. Autumn Quarter. Three lecture and discussion periods each week. Prerequisite, Economics 618. Mr. Duffus.

The facilities, organization and methods of operation of trans-oceanic and American coastwise ocean shipping; trade routes; types of vessels; classification, administration, and development of ports; port charges; railroad port differentials; shipping rates; marine insurance; traffic agreements and conferences; the American Merchant Marine. The choice of route and vessel for shipping. Federal regulation.

748. Valuation of Railroads and Public Utilities. Three credit hours. Winter Quarter. Three lecture and discussion periods each week. Prerequisite, Economics 618 or 648. Mr. Power.

A study of the various methods of valuation including original cost, and different types of reproduction theories, with special reference to physical and non-physical elements, and their significance in determining reasonableness of rates, valuation for con-

demnation and for taxation. Study is made of typical valuation and rate cases before state public utilities commissions and before the Interstate Commerce Commission.

752. Traffic Management—Service Problems. Three credit hours. Winter Quarter. Prerequisite, Economics 618. Mr. Duffus.

Nature and function of traffic management; traffic departments and carriers, industrial and mercantile concerns, trade associations. Railroad freight service: types of transit privileges; bills of lading; routing; tracing of shipments; claims; storage; demurrage; switching. Analysis of services offered by motor truck carriers, inland waterways, parcel post, railway express.

753. Traffic Management—Rate Problems. Three credit hours. Spring Quarter. Prerequisite, Economics 618. Mr. Duffus.

Rate-making activities of common carriers and industrial traffic departments including: consideration of the rules of Interstate Commerce Commission and of state commissions governing the compilation, filing and publication of rates by common carriers; commission procedure in rate cases; and the principles followed by commissions in deciding such cases.

760. Personal Insurance. Three credit hours. Winter Quarter. Three lecture and discussion periods each week. Mr. E. L. Bowers.

Life insurance: measurement of risk; net premiums; expense; reserves; surrender values and policy loans; surplus and dividends; needs of individuals, partnerships, and corporations for life insurance; kinds of policies for filling these wants; adaptation of insurance and annuities to individual cases; comparison of the policy provisions of various companies; types of companies; their organization and operation. Accident and health insurance; types of policies, important features to examine in health and accident policies; rates. Agency organization; state supervision.

Not open to students who have credit for Economics 624.

764. Property Insurance. Three credit hours. Spring Quarter. Three lecture and discussion periods each week. Mr. E. L. Bowers.

A study of the following lines of insurance: fire and marine; automobile; burglary and robbery; earthquake; wind-storm; plate glass; hail, frost and rain; aviation; business interruption. Some attention to other related forms of insurance will be paid. Credit and title insurance; corporate bonding; check alteration and forgery insurance. Types of companies; sales organization; adjustment of losses; loss prevention; opportunities in the insurance business.

767-768-769. Practice Work in Insurance. One to three credit hours. All Quarters. Mr. E. L. Bowers.

Students are assigned to work with a cooperating insurance organization. The work is supervised and careful reports are required of both practice and observation.

FOR GRADUATES

Prerequisite for Graduate Work: For major work in business organization a minimum of fifteen Quarter-credit hours and the consent of the instructor are required.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Corporation Organization and Finance. One to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Hoagland.

Individual investigations with group discussions participated in by those investigating related subjects.

804. Corporation Finance for Graduate Students. Three credit hours. One Quarter. Winter and Spring. Mr. Hoagland, Mr. Duffus.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

Not open to students who have credit for Business Organization 840.

814. Research in Insurance. One to six credit hours. Winter and Spring Quarters. Mr. E. L. Bowers.

A problem which requires original work is assigned to each member of the class. As the information obtained from interviews, correspondence, and printed sources is obtained, it is given to the class in the form of a report. Finally, the information is presented in the form of a complete thesis.

816. Marketing for Graduate Students. Three credit hours. One Quarter. Autumn and Winter. Prerequisite, consent of the instructor. Mr. Weidler, Mr. Maynard, Mr. Beckman.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

817. Research in Marketing, including Advertising and Sales. One to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Weidler, Mr. Maynard, Mr. Cordell, Mr. Beckman.

Individual investigations with group discussion participated in by those investigating related subjects.

820. Problems of Banking and of Stock Prices. One to three credit hours. Spring Quarter. Mr. Dice.

A study of the leading problems relating to banking and to stock prices. The desires of the group will determine whether the major part of the course shall be devoted to problems of banking or to problems involved in determining the movements of stock prices.

823. Research in Banking. One to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Dice.

The work under this head will consist of study made of special problems in the field of banking. Each student in conference with the instructor in charge will choose some problem along his line of interest. Large emphasis will be placed on field work. It is expected that each student make a more or less prolonged study of his problem, from time to time present the material he has gathered in the form of reports, and write a paper which shall represent the work completed.

827. Stock Market for Graduate Students. Three credit hours. Autumn Quarter. Mr. Dice.

A study of the methods and technique of the market for stocks; the effects of the stock market on our economic organization; the methods of rating stocks; the relation between earnings and stock prices; and the methods of forecasting stock price movements.

831. Graduate Seminary in Business Organization for Beginning Graduate Students. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Hoagland.

832. Graduate Seminary in Business Organization for Advanced Students. Two credit hours. Autumn, Winter, and Spring Quarters. All instructors.

833. Graduate Course in Industrial Management. Three credit hours. Autumn Quarter. Mr. Davis.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

834. Applications of Economic Theory in Industrial Organization and Management. Three credit hours. Spring Quarter. Mr. Wissler.

The examination of selected principles in economic theory as to their bearing upon

optimum plant size and location, wage determination and scientific management, production costs, depreciation and obsolescence, and similar industrial management problems.

835. Research in Industrial Management. One to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Wissler, Mr. Davis.

Individual investigations with much group discussion participated in by those investigating related subjects, as may be arranged.

845. Transportation and Public Utilities for Graduate Students. Three credit hours. One Quarter. Autumn and Winter. Mr. Duffus, Mr. Power, Mr. Dewey.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

846. Research in Transportation and Public Utilities. One to six credit hours. One Quarter. Autumn, Winter, Spring. Mr. Duffus, Mr. Power.

Individual investigations of problems in (1) railroad, highway, water, and air transportation, or (2) public utility management and regulation, with group discussions participated in by those investigating related subjects.

CERAMIC ENGINEERING

Office, 131 Lord Hall

PROFESSORS WATTS AND BOLE (RESEARCH), ASSOCIATE PROFESSOR CARRUTHERS, ASSISTANT PROFESSOR KING, MR. McSWINEY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in ceramic engineering in addition to any prerequisites stated in the description of the courses.

600. Theory of Drying. Three credit hours. Autumn Quarter. Three lectures and six hours of preparation each week. Prerequisite, two Quarters of college physics. Mr. Carruthers.

A study of the fundamental physical laws and theories involved in drying ceramic wares and their application to commercial practice.

603. Elements of Ceramic Plant Engineering. Five credit hours. Winter Quarter. Five lectures and ten hours of preparation each week. Prerequisite, Ceramic Engineering 600. Mr. Carruthers.

A study of the fundamental principles and equipment used in ceramic manufacturing processes, including the handling of hot gases.

605. Bodies, Glazes, and Colors. Four credit hours. Spring Quarter. Four lectures each week. Prerequisite, Ceramic Engineering 615. Mr. Watts.

Ceramic bodies, glazes, and colors.

610. Refractories and their Uses. Five credit hours. Spring Quarter. Five lectures each week. Mr. King.

Lectures on refractories, their physical and chemical compositions and properties, their utilization and testing.

615. Ceramic Calculations. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, courses in metallurgical and ceramic analysis. Mr. King.

Solution of chemical and physical problems involved in compounding ceramic

mixtures, including wet blending. Also instruction in development of series, containing one, two, and three variables.

620. Physical and Chemical Measurements of Clays and Other Ceramic Materials. Five credit hours. Winter Quarter. Two recitations and eight laboratory hours each week. Prerequisite, Ceramic Engineering 615, Chemistry 681, and a course in ceramic laboratory. Mr. King.

Application of physical chemical laws to ceramic materials and compounds. Laboratory practice in determination of the essential physical and chemical properties of ceramic mixtures and compounds in the plastic, dry, vitrified, and fused states.

701. Laboratory in Stoneware, Saggers, and Terra Cotta. Five credit hours. Autumn Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 605, 615, 620. Mr. Watts.

Practice in the production of stoneware, saggers, and terra cotta, including the making of bodies, slips, engobes and glazes. All ware is fired and tested.

702. Laboratory in Whitewares. Five credit hours. Winter Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 701 or 721. Mr. Watts.

Practice in the production of fine ceramic wares, including the making of bodies and glazes. All ware is fired and tested.

703. Laboratory in Ceramic Colors. Five credit hours. Spring Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 702 or 722. Mr. Watts.

Practice in the production of special ceramic wares, glazes and colors, including underglaze and overglaze colors. All ware is fired and tested.

704. Laboratory in Metal Enamels. Five credit hours. Autumn Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 605, 615, and 620. Mr. King.

The theory and practice in the enameling of cast iron and steel.

705. Ceramic Designing. Five credit hours. Autumn Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 601 and Mechanics 602. Mr. Carruthers.

Designing of clay plant structures and equipment such as bins and retaining walls. Practical problems in structural design and storage of clays.

706. Ceramic Designing. Five credit hours. Winter Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 705. Mr. Carruthers.

A continuation of Ceramic Engineering 705. Study of drying and fan problems and the design of driers.

707. Ceramic Designing. Five credit hours. Spring Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 706. Mr. Carruthers.

A continuation of Ceramic Engineering 706. Study of firing and factory equipment problems and design of kilns and complete clay plants.

708. Technology of Glass. Three credit hours. Autumn Quarter. Two lectures and three laboratory hours each week. Prerequisite, Ceramic Engineering 615. Mr. McSwiney.

Practice in melting typical glass batches. Studying physical behavior during the

melting process and in the molten state. Measurement of some of the physical properties of the glasses produced experimentally and of commercial glasses.

721. Laboratory in Refractories. Five credit hours. Spring Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 610, 615, and 620. Mr. King.

Practice in the production of refractory wares. All ware is fired and tested.

722. Laboratory in Heavy Clay Wares. Five credit hours. Winter Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 600, 601, 603, and 620. Mr. Bole.

Practice in the production of brick, drain tile and other crude wares, including plant exercises at the state-owned laboratory.

750. Special Problems. Two to seven credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, fundamental ceramic engineering courses and consent of department. This course may be repeated for different problems or continuation of original problem, with total credit not to exceed fifteen hours. All instructors.

This course is designed to permit any properly qualified student to avail himself of the library and laboratory facilities of the department for carrying on a special investigation or for adding to his knowledge and technique in some ceramic subject.

FOR GRADUATES

Prerequisite for Graduate Work: The courses offered presuppose good training in the fundamentals of inorganic chemistry, including qualitative and quantitative analysis, a knowledge of the general principles of ceramic technology, such as is given in the lectures of the second and third years of the course, a knowledge of mathematics through calculus and analytical mechanics, physics to the extent of a good year's course, with laboratory and problem work, and engineering drawing to enable free attack of original plans.

For major work a candidate must hold a baccalaureate degree in Ceramic Engineering.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research Work. One to fifteen credit hours. Autumn, Winter, and Spring Quarters. Time arranged with the instructor. Prerequisite, the permission of the instructor in charge.

Research work in analytical and physical chemistry of silicates is conducted under the supervision of Mr. Watts and Mr. Bole; in mineralogy and geology of clay deposits and testing of clays and clay products, under Mr. Watts and Mr. Bole; in the engineering and designing of structures for ceramic industries under Mr. Carruthers; in refractory and metal enameling problems under Mr. King.

810-811-812. Porcelain for Electrical and Other Special Purposes. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Watts.

815-816-817. Advanced Experimental Work. One to fifteen credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Ceramic Engineering 620 and 703. Mr. Watts, Mr. Bole, Mr. King, Mr. Carruthers.

This course is given to furnish opportunity for advanced studies along special lines or for investigations in the various fields of clay, cement, enamel, or glass manufacture.

CHEMICAL ENGINEERING

Offices, 179, 180 Chemistry Building

PROFESSOR WITHROW, MR. VILBRANDT, MR. DUNCOMBE, MR. KOFFOLT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

700. Elements of Chemical Engineering. Two credit hours. Winter Quarter. Mr. Withrow, Mr. Duncombe.

A thorough discussion of the fundamental principles underlying the engineering operations which constitute the body of chemical engineering as a branch of engineering. An introduction is given to the mechanical equipment which is used to carry out these engineering operations in the chemical industries. The relationship between chemical processes and the selection of engineering equipment to carry out the engineering operations demanded by these chemical processes is emphasized. The market demand, economics, and chemistry fundamental to, or utilized by, an industry is referred to as the basis which determines the engineering operations necessary in utilizing the chemistry for productive manufacture. The main detailed engineering operations taken up are transportation; storage; crushing and grinding; calcination; solution; mixing and agitation; classifying; the separation of solids from liquids by sedimentation, filtration, crystallization, refrigeration, precipitation, evaporation, distillation, and electrolysis; the separation of liquids from liquids; drying; absorption; and the special engineering manipulation required in highly standardized or individualized chemical processes such as gasification, hydrogenation, sulphonation, nitration, chlorination, reduction, cracking, hydroxylation, autoclaving, and impregnation.

701-702. Industrial Chemistry. Three credit hours. Autumn and Winter Quarters. Three lectures each week. Prerequisite or concurrent, physical chemistry, except with special permission of the instructor. Mr. Withrow.

The fundamental lecture course in industrial chemistry, dealing with the problems of the chemical industries, and placing stress upon the economic questions involved in chemical manufacturing, materials of plant construction, as well as the engineering operations involved in chemical engineering, and the principles underlying the applications of chemistry and engineering to a selected number of chemical industries. The work of the Autumn Quarter deals especially with the inorganic industries, while that of the Winter Quarter is related to the organic industries.

703. Inspection Trip to the East. No credit hours. Week of May 1, 1933, and odd-numbered years thereafter. Prerequisite, permission of the instructor. Mr. Withrow, Mr. Duncombe.

The trip includes Akron, Ohio; Albany, New York City, Long Island, and West Sayville, New York; Jersey City, Grasselli, and Deep Water Point, New Jersey; Wilmington, Baltimore, and Curtis Bay, Maryland; and Washington, D. C. The entire expense need not exceed $80.00. A satisfactory written report upon the work of the trip and an examination are required.

***704. Inspection Trip to the West.** No credit hours. Week of May 1, 1934, and even-numbered years thereafter. Prerequisite, permission of the instructor. Mr. Withrow, Mr. Koffolt.

The trip includes Dayton, West Carrollton, Hamilton, Cincinnati, and Ivorydale, Ohio; Kensington, Illinois; Grasselli and Whiting, Indiana; Chicago and Argo, Illinois; Detroit, Wyandotte, and Midland, Michigan. The entire expense need not exceed $55.00. A satisfactory written report upon the work of the trip and an examination are required.

705. Written Reports. No credit hours. Spring Quarter. Week of May 1. Prerequisite, Chemical Engineering 701-702. Mr. Withrow.

A substitute course for Chemical Engineering 703 or 704, allowed only upon presentation of reasons satisfactory to the instructor in charge. The course consists of

* Not given in 1932-1933.

assigned reading designed to familiarize the student with all that can be found in the literature or plants regarding chemical engineering, and specified chemical processes, together with a full written report.

706. Chemical Engineering and Industrial Chemistry Laboratory. Two to five credit hours. Autumn Quarter. One hour conference and fourteen laboratory hours each week. Prerequisite or concurrent, Chemical Engineering 701, and an acceptable course in analytical chemistry. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

An introduction to industrial chemical research through assigned manufacturing problems, beginning with the general chemical industries. The specific problems are so chosen as to disclose the fundamental principles underlying the assigned industry, and practice is afforded in the preparation of written reports. Opportunity is given for study of operating efficiency of certain engineering equipment utilized in the fundamental engineering operations of chemical engineering. Weekly inspection trips are taken to plants in and around Columbus for study and report upon equipment and operation. Great emphasis is laid upon methods of attacking problems and upon organization of reports. Certain types of problems with engineering equipment, in factory research and in applied electrochemistry, are required of all students, after which opportunity is given the student to select special problems in various portions of the fields of industrial chemistry and chemical engineering such as absorption systems, filtration, petroleum and sugar technology, intermediates, wood distillation, insecticides, starch, lime, chlorine, and plant fume questions.

707. Engineering Chemistry, Chemical Engineering Laboratory. Three credit hours. Winter Quarter. One conference and eight laboratory hours each week. Prerequisite, Chemical Engineering 706; concurrent, Chemical Engineering 702. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

A continuation of Chemical Engineering 706, with special emphasis laid upon technical methods of control as applied to industrial processes.

708. Practical Experience in Chemical Engineering Work. Six credit hours. Prerequisite, Chemical Engineering 700. Mr. Withrow.

Academic credit for this course is based on the reports of a student who has had practical experience of a chemical engineering character in a semi-responsible position covering a more advanced grade of work than that required in Chemical Engineering 501.

The student shall present a satisfactory report, the outline and basis of which, it is preferred, shall be arranged in conference prior to beginning the work. In general the report shall cover in very considerable detail, the particular industry with which the student is connected, in respect to market demand and economics, chemistry involved, engineering operations, plant layout, special equipment and design, operation methods, costs and efficiencies (in so far as this information is obtainable), labor problems, and safety and health hazards, together with other pertinent matter. Flow sheets, production schedules, sketches and photographs to illustrate the report, are especially to be desired.

The student also who has had twelve months' or more experience in industry may present a report which, if satisfactory, will be accepted in lieu of the above requirements.

710. Applied Electrochemistry. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Chemistry 681-682-683 or special permission. Mr. Withrow.

A survey of the electrochemical industries, and a discussion of the principles underlying the application of the electric current in chemical industries.

712-713-714. Advanced Chemical Engineering Machinery Laboratory. Two to six credit hours. Autumn, Winter, and Spring Quarters. One conference and five to seventeen laboratory hours each week. Pre-

requisite, Chemical Engineering 706-707 or special permission of the chairman of the department. Mr. Withrow, Mr. Koffolt.

An advanced course dealing with various chemical engineering equipment with the view of acquainting students with all types of equipment, their design, and operation. The application of thermodynamics and graphics to chemical engineering problems.

The conferences cover topics chosen from the field of chemical engineering. Specific topics are given each Quarter.

Students may repeat these courses with credit, with the approval of the chairman of the department, inasmuch as the topics vary from year to year. The following is a list of topics from which work in this course is chosen: Graphical Chemical Engineering Computations, Drying, Humidification, Dehumidification, Adsorption, Absorption, Fume and Smoke, Crystallization, Filtration, Crushing and Grinding, Furnace and Pyrometry, Evaporation, Refrigeration, Distillation, Cracking, Heat Transfer, and Flow of Fluids.

FOR GRADUATES

Prerequisite for Graduate Work: For admission to graduate work in industrial chemistry and chemical engineering, a candidate must have had thorough preparation in general inorganic chemistry, qualitative and quantitative analysis, and an introductory course in organic chemistry and physics.

Preparation in mathematics through calculus, with some engineering drawing and mineralogy, although not required, is desirable, as it enables graduate students in this department to cover a wider field of application problems.

The department stands ready to advise students in advance upon their preliminary undergraduate study schedule.

An undergraduate student shall not be permitted to take any course in the "800" or "900" groups except by permission of the Graduate Council.

801. Introductory Problems in Chemical Engineering. Two to five credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, satisfactory course in the field of the problem undertaken. The course may be repeated on other problems as desired. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

The work of the course is carried on by individual conference, library, and laboratory work and consists of problems involving an introduction to the application of physics, mathematics, drawing, mechanics, and chemistry in the field of chemical engineering.

900-901-902. Advanced Industrial Chemistry and Chemical Engineering. Two to five credit hours. Autumn, Winter, and Spring Quarters. One hour conference and five to fourteen laboratory hours each week. Prerequisite, acceptable courses in industrial chemistry, or permission of instructor. Mr. Withrow.

An advanced course dealing with the solution of minor problems in industrial chemistry and chemical engineering. Special work will be planned along lines in industrial chemistry or chemical engineering as may be desired by the individual student.

905-906-907. Seminary in Industrial Chemistry and Chemical Engineering. Two credit hours. Autumn, Winter, and Spring Quarters. Two conference hours each week. Prerequisite, satisfactory courses in industrial chemistry. Mr. Withrow.

The course consists of conferences and reports upon methods of attacking special problems in industrial chemistry and chemical engineering. The topics vary from Quarter to Quarter, keeping in touch with the constant development of chemical industry.

950. Industrial Chemistry and Chemical Engineering Research. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, satisfactory

courses in the chosen field of research. Mr. Withrow, Mr. Duncombe, Mr. Koffolt.

Advanced research problems and dissertation in industrial chemistry, applied electrochemistry, and in chemical engineering.

CHEMISTRY

Office, 115 Chemistry Building
General Chemistry Office, 112 Chemistry Building

PROFESSORS EVANS, McPHERSON, HENDERSON, FOULK, BOORD, AND MACK, ASSOCIATE PROFESSORS DAY AND FRANCE, ASSISTANT PROFESSORS HOLLINGSWORTH, BRODE, JOHNSTON, MOYER, AND WOLFROM, MR. FERNELIUS, MR. BACHMAN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

621. Advanced Quantitative Analysis. Four or five credit hours. Autumn Quarter. One conference and nine or twelve laboratory hours each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

An extension of the first year's work in quantitative analysis, including electrometric titrations, colorimetric and turbidimetric analysis, and hydrogen ion determinations.

622. General Quantitative Analysis. Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

General principles of chemical analysis.

623. Gas Analysis. Four or five credit hours. Winter Quarter. One conference and nine or twelve laboratory hours each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Hollingsworth.

An introductory course in gas analysis, including some technical applications.

624. Advanced Qualitative Analysis. Four or five credit hours. Spring Quarter. One recitation and nine or twelve laboratory hours each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Hollingsworth.

The general system of qualitative analysis, as published by Noyes and Bray, forms the basis of this course. It includes the rare elements, and emphasizes such points as the detection of small quantities of substances and a rough estimate of the percentages present.

625. Water Analysis. Five credit hours. Spring Quarter. Three lectures and six laboratory hours each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

Methods of sanitary and industrial water analysis, and interpretation of the analytical results.

627. Industrial Water Problems. Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

Chemistry of scale formation, foaming and priming in steam boilers, corrosion in hot and cold water systems, and the purification of water for industrial use.

641. Qualitative Organic Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in laboratory work in organic chemistry. Mr. Brode.

A study of the systematic methods of separation, purification, and identification of organic compounds.

642. Quantitative Organic Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in laboratory work in organic chemistry. Mr. Brode.

Practice in the standard methods for the quantitative analysis of organic compounds, including combustion, and the quantitative estimation of organic radicals present in various compounds.

647-648. Organic Chemistry. Three credit hours. Autumn and Winter Quarters. Three lectures or recitations each week. Prerequisite, acceptable courses in general and analytical chemistry. Mr. Boord.

The fundamental course in organic chemistry. Chemistry 647 is devoted to a discussion of the aliphatic hydrocarbons and their derivatives and Chemistry 648 to a discussion of the coal tar compounds.

Not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

649-650. Organic Chemistry: Laboratory. Three credit hours. Autumn and Winter Quarters. Nine laboratory hours each week. Prerequisite or concurrent, Chemistry 647-648. Mr. Boord.

The laboratory work naturally belonging to Chemistry 647-648. The preparation of a series of typical organic compounds, their purification, and a study of their properties.

Chemistry 649 is not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

661. Advanced Inorganic Chemistry. Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, two years of courses in chemistry. Mr. Henderson.

An advanced course in inorganic chemistry with emphasis upon the fundamental topics of inorganic compounds, their preparation, classification and reactions.

662. Advanced Inorganic Chemistry. Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, two years of courses in chemistry. Mr. Henderson.

An advanced course in inorganic chemistry, stressing the more difficult points in chemical theory in the elementary courses.

663. The Rare Elements. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Chemistry 661 or equivalent. Mr. Henderson.

Lectures on the chemistry of the less familiar elements, emphasizing their relations to the well-known elements, as well as their technical applications.

***668. The Ammonia System of Compounds.** Three credit hours. Spring Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in physical chemistry. Mr. Fernelius.

Liquified gases as solvents. Systems of compounds. Inorganic nitrogen compounds. A consideration of the properties of liquid ammonia solutions, including solutions of metals and intermetallic compounds. Generalized theory of acidity.

672. Inorganic Preparations. Three credit hours. Spring Quarter. Nine laboratory hours each week. Prerequisite, acceptable courses in general chemistry and quantitative analysis. Mr. Henderson.

Methods employed in the preparation of pure inorganic compounds. The chief classes of such compounds. The laboratory preparation of a number of examples sufficient to develop reasonable technique in applying the methods and to illustrate the classes.

* Not given in 1932-1933.

675. The Phase Rule. Three credit hours. Winter Quarter. Three meetings each week. Prerequisite, acceptable courses in physical chemistry. Mr. Henderson.

A study of the phase rule and its applications in chemical research.

681-682-683. Physical Chemistry. Three credit hours. Autumn, Winter, and Spring Quarters. Three lectures each week. Prerequisite or concurrent, acceptable courses in organic chemistry, physics, and calculus (two Quarters). Mr. Mack, Mr. Johnston.

The fundamental course in physical chemistry, arranged for students specializing in chemistry.

691-692-693. Physical Chemistry: Laboratory. Two credit hours. Autumn, Winter, and Spring Quarters. Six laboratory hours each week. Prerequisite or concurrent, an acceptable course in physical chemistry. Mr. Mack, Mr. Johnston, and assistants.

Introduction to physico-chemical measurements. Any one of these courses may be taken in any Quarter.

695. Colloid Chemistry. Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in chemistry and physics. Mr. France.

A fundamental course in colloid chemistry.

696. Theoretical Electrochemistry. Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in physical chemistry. Mr. France.

A fundamental course in theoretical electrochemistry.

697. Electrochemistry: Laboratory. Two credit hours. Autumn Quarter. Six laboratory hours each week. Prerequisite or concurrent, Chemistry 696. Mr. France.

A general laboratory course in theoretical electrochemistry.

698. Colloid Chemistry: Laboratory. Two credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite or concurrent, Chemistry 695. Mr. France.

A general laboratory course in colloid chemistry.

699. Minor Problems in Chemistry. Three to fifteen credit hours. Any Quarter. Conference, library, and laboratory work. Prerequisite, satisfactory courses in the field of the problem undertaken. A student may repeat this course and may spend all or any part of his time on it during a Quarter.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in some chemical subject.

A student may exercise entire freedom in his choice of instructor to conduct his work in this course, but as a rule, topics in organic chemistry will be under the direction of Mr. McPherson, Mr. Evans, Mr. Boord, Mr. Brode, Mr. Fernelius, Mr. Wolfrom, and Mr. Bachman; in inorganic chemistry, under Mr. Henderson, Mr. Day, and Mr. Fernelius; in physical chemistry, under Mr. Mack, Mr. France, Mr. Day, Mr. Johnston, and Mr. Fernelius; in analytical chemistry, under Mr. Foulk, Mr. Hollingsworth, and Mr. Moyer; and in colloid chemistry and electrochemistry, under Mr. France.

782. Chemical Bibliography. One credit hour. Winter Quarter. One conference each week. Prerequisite, acceptable courses in analytical and organic chemistry. Mr. Henderson.

Designed to train the advanced student in the use of the chemical library, and to instruct him in the character of various chemical journals, dictionaries, reference books, and other sources of information pertaining to chemical subjects.

783. Chemical Biography. One credit hour. Spring Quarter. One lecture each week. Prerequisite, acceptable courses in analytical and organic chemistry. Mr. Henderson.

Designed to familiarize the advanced student with the leading personages in chemistry, particularly those of recent and contemporary times, as well as with the available sources of information relating to such personages.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 756.

FOR GRADUATES

Prerequisite for Graduate Work. For admission to graduate work in chemistry a candidate must have as a minimum a thorough preparation in general inorganic chemistry, qualitative and quantitative analysis and introductory courses in organic chemistry and in physical chemistry (including laboratory courses in both subjects). He must also have completed acceptable courses in physics and mathematics (including calculus) since these subjects are prerequisite to physical chemistry. Deficiencies in these courses may be made up in undergraduate classes, but will not be counted toward a degree.

Preliminary Examination for the Master's Degree. At least one Quarter prior to the Convocation at which he expects to receive the Master's degree, the candidate must pass a written preliminary examination in each of the chemical courses specified for admission to graduate work. An examination covering these topics will be held each Quarter in the week preceding the regular undergraduate examination schedule. He must also give evidence of his ability to read a typical article in a chemical magazine in the French or German language, preferably the latter.

General Examination for the Doctor's Degree. Not later than the third Quarter prior to the Convocation at which he expects to receive the Doctor's degree, the candidate must pass a general examination which may be written or oral or both. This examination will presuppose that the candidate has materially extended his knowledge of chemistry along all the lines required for admission to graduate work; that he has acquired such broad familiarity with his especial field of concentration in chemistry as may be reasonably expected from courses and seminaries available, from laboratory experience, and from habitual use of the chemical library (especially the current literature); that he is reasonably familiar with the use of a chemical library, with eminent chemical personages, and with the outline of the historical development of chemical science; and that he possesses a reading knowledge (in chemical literature) of both French and German.

The written examination will be conducted at the end of the second week of the Quarter in which it is taken and the oral examination will be conducted later during the same Quarter in accordance with a schedule arranged by the Dean of the Graduate School.

Final Examination. For the Master's degree the final examination, immediately preceding Convocation, will be oral and will cover the courses pursued for the degree, including the thesis. For the Doctor's degree the final examination, immediately preceding Convocation, will be oral and will be confined to the dissertation and topics intimately related to it.

An undergraduate student shall not be permitted to take any course in the "800" or "900" groups except by permission of the Graduate Council.

822. Seminary in Analytical Chemistry. Three credit hours. Autumn Quarter. Three conferences each week. Prerequisite, acceptable courses in analytical, organic, and physical chemistry. Mr. Foulk.

Topic for 1932-1933: Standard Substances used in Chemical Measurements.

823. Seminary in Analytical Chemistry. Two credit hours. Winter Quarter. Two conferences each week. Prerequisite, acceptable courses in quantitative analysis and organic chemistry. Mr. Moyer.

Topic for 1932-1933: Determination of p H Values and Electrometric Titration.

830. Historical Chemistry. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry. Mr. Henderson.

A general course in the history of chemistry with special reference to the development of the theories of the science.

841. Advanced Organic Chemistry. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry including laboratory work. Mr. Boord.

An advanced course in the fundamental principles of organic chemistry, covering the chain hydrocarbons and their derivatives.

842. Advanced Organic Chemistry. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry including laboratory work. Mr. Boord.

A continuation of Chemistry 841, covering the carbocyclic and heterocyclic compounds, and including under the former, aromatic, hydroaromatic, and terpene derivatives.

844. Advanced Organic Preparations: Laboratory. Three credit hours. Autumn Quarter. Nine hours of library, conference, and laboratory work each week. Prerequisite or concurrent, Chemistry 841. Mr. Boord, Mr. Brode.

An advanced course in the synthesis of aliphatic organic compounds that involve difficulties, special stress being placed upon yield and purity of products.

845. Advanced Organic Preparations: Laboratory. Three credit hours. Winter Quarter. Nine hours of library, conference and laboratory work each week. Prerequisite or concurrent, Chemistry 842. Mr. Boord, Mr. Brode.

A continuation of Chemistry 844. The work consists in the synthesis of aromatic compounds. Chemistry 844 and 845 lead directly to minor research problems in organic chemistry.

850. Seminary in Organic Chemistry. Three credit hours. Autumn Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Brode.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1932-1933: The Terpenes and Related Carbocyclic Compounds.

851. Seminary in Organic Chemistry. Three credit hours. Winter Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Evans.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1932-1933: The Chemistry of the Carbohydrates.

852. Seminary in Organic Chemistry. Three credit hours. Spring Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Wolfrom.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1932-1933: Recent Advances in Organic Chemistry.

854. Seminary in Organic and Inorganic Chemistry. Three credit hours. Offered in Summer Quarter only. Prerequisite, graduate standing in chemistry.

Topics for 1932: Recent ideas on valence, free groups, liquid ammonia solutions, topics from the borderland of inorganic and organic chemistry, conductance and properties of solutions; recent developments.

Open to auditors and advanced students not working for credit.

861-862-863. Physical Chemistry: Laboratory. Two or three credit hours. Autumn, Winter, and Spring Quarters. Nine laboratory hours each week. Prerequisite, acceptable courses in physical chemistry including elementary laboratory work. Mr. Johnston and assistants.

Advanced courses in physicochemical experimental work designed to illustrate the more important principles of physical chemistry, to develop skill in this type of laboratory work and to form a basis for research. Any one of these courses may be taken in any Quarter.

†865. Atomic Structure. Three credit hours. Winter Quarter. Three lectures or conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Johnston.

A survey of the modern theories of the structure of the atom.

866. Seminary in Inorganic Chemistry. Three credit hours. Winter Quarter. Three conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Day.

Topic for 1932-1933: Solutions of Electrolytes.

867. Seminary in Inorganic Chemistry. Two credit hours. Autumn Quarter. Two conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Henderson.

Topic for 1932-1933: The Background of Scientific Thinking.

***881-*882-*883. Lectures in Advanced Physical Chemistry.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Chemistry 681-682-683. Given in alternate years in lieu of Chemistry 887-888-889. Mr. Mack.

A number of topics of special interest to physical chemists at the present time will be treated, such as special topics from the field of kinetics of chemical reactions, kinetics of adsorption and of evaporation from liquid and solid surfaces, dielectric constants, wave-mechanical theory of chemical bonds, etc.

887-888-*889. Lectures in Advanced Physical Chemistry. Three credit hours. Autumn and Winter Quarters. Prerequisite, Chemistry 681-682-683. Given in alternate years in lieu of Chemistry 881-882-883. Mr. Johnston.

Training in the use of thermodynamics as a tool for solving chemical problems. Topics to be discussed include: vapor pressure; solutions and solubility; molecular spectra; free energy; modern theories of electrolytic dissociation; galvanic cells; and the various factors associated with the measurement and control of chemical equilibria.

891. Seminary in Colloid Chemistry. Three credit hours. Winter Quarter. Three conferences each week. Prerequisite, acceptable courses in chemistry and physics. Mr. France.

Topic for 1932-1933: The Physics and Chemistry of Surfaces.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

892. Seminary in Physical Chemistry. Three credit hours. Autumn Quarter. Three conferences each week. Prerequisite, acceptable courses in physical chemistry and thermodynamics. Mr. Johnston.

Topic for 1932-1933: The Third Law of Thermodynamics.

950. Chemical Research. Autumn, Winter, and Spring Quarters. Library, conference and laboratory work. Prerequisite, acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work.

Research work in organic chemistry is conducted under the supervision of Mr. McPherson, Mr. Evans, Mr. Boord, Mr. Brode, Mr. Fernelius, Mr. Wolfrom, Mr. Bachman; in inorganic chemistry under Mr. Henderson, Mr. France, Mr. Day, and Mr. Fernelius; in physical chemistry under Mr. Mack, Mr. France, Mr. Day, Mr. Johnston, and Mr. Fernelius; in analytical chemistry under Mr. Foulk, Mr. Hollingsworth, and Mr. Moyer; in colloid chemistry and electrochemistry under Mr. France.

NOTE: Attention is called to the fact that courses in physiological chemistry are listed elsewhere in this Bulletin under the Department of Physiological Chemistry and Pharmacology.

NOTE: For Industrial Chemistry, Applied Electrochemistry, and Chemical Engineering Courses see the Department of Chemical Engineering.

CIVIL ENGINEERING

Office, 108 Brown Hall

PROFESSORS SHERMAN, ENO (RESEARCH), MORRIS, CODDINGTON, SLOANE, SHANK, AND PRIOR, ASSOCIATE PROFESSOR MONTZ, ASSISTANT PROFESSOR LARGE, MR. MARSHALL, MR. WYATT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

608. Precise Surveying. Three credit hours. Autumn Quarter. One recitation and two laboratory periods each week. Prerequisite, calculus, railroad surveying, and summer surveying camp. Mr. Coddington, Mr. Marshall.

Primary traverse, base line measurements, field triangulation, precise leveling.

609. Adjustment of Observations. Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. Prerequisite, Civil Engineering 608. Mr. Coddington, Mr. Marshall.

Theory of adjustment of observations, using work of preceding term; precise maps.

701. Concrete Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, course in Cement and Concrete. Mr. Shank, Mr. Large.

Theory and design of reinforced concrete structures.

702. Bridge Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, course in Stresses in Structures. Mr. Morris.

A course in design of steel roofs and bridges.

703. Water Supply Engineering. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mechanics 603 or 605 and 607. Mr. Prior.

Construction and operation of public water supplies.

704. Masonry Construction. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Civil Engineering 701 or 702. Mr. Sherman.

Discussion of materials and methods of masonry construction and foundations.

705. Masonry Structures. Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, Civil Engineering 704. Mr. Sherman.

Application of principles of Civil Engineering 704 to various masonry structures.

709. Geodetic Engineering. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Civil Engineering 608 and 609. Mr. Coddington.

A discussion of some of the problems of geodetic engineering which involve the earth's curvature.

710. Map Projections. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Civil Engineering 709. Mr. Coddington.

Discussion of methods of projecting the earth's surface into plane maps.

711. Factory Building Construction. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanics 602. Mr. Shank.

Stresses in trusses, columns, beams, and girders in factory buildings, with practice in designing.

712. Trusses. Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Prerequisite, Mechanics 602. Mr. Wyatt, Mr. Shank, Mr. Morris, Mr. Montz.

Stresses in and design of steel-frame mill buildings.

713. Concrete Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mechanics 602. Mr. Large.

A course for architectural engineers, similar to Civil Engineering 701.

714. Steel-Frame Buildings. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Civil Engineering 712 or 702. Mr. Morris.

Stresses in and design of steel-frame office buildings.

730. Railway Engineering. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, course in Topographic Surveying and Mechanics 602. Mr. Sherman.

A railway project used to illustrate the engineering economics of inception, financing, construction, and operation of engineering projects.

731. Railway Engineering. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Civil Engineering 730. Mr. Sherman.

Continuation of Civil Engineering 730 into the discussion of the larger engineering economic problems of transportation.

732. Contracts and Specifications. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Civil Engineering 704 and a course in Roads and Pavements. Mr. Sherman.

A discussion of the principles underlying engineering contracts and specifications.

733. Tall Buildings. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Civil Engineering 712. Mr. Morris.

Stresses in and design of steel-frame office buildings.

734. Advanced Bridges. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Civil Engineering 702. Mr. Morris.

Stresses in and design of arch bridges.

735. Advanced Bridges. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Civil Engineering 702. Mr. Morris.

Design of movable and long-span bridges.

736. Municipal Engineering. Three credit hours. Autumn Quarter. Three lectures each week, with assigned readings. Prerequisite, courses in Sanitary Engineering and Roads and Pavements. Mr. Prior.

General lectures on municipal engineering including city planning, street administration, waste treatment, etc.

738. Highway Plans and Surveys. Three credit hours. Autumn Quarter. One recitation and two three-hour laboratory periods each week. Prerequisite, courses in Topographic Surveying and Roads and Pavements. Mr. Sloane.

Reconnoissance and location surveys, alignment and grades, curve widening and super-elevation, bridge and culvert surveys, preparation of plans and estimates, study of highway standards.

739. Bituminous Roads and Surfaces. Three credit hours. Winter Quarter. One recitation and two three-hour laboratory periods each week. Prerequisite, course in Roads and Pavements. Mr. Sloane.

Study of various types of bituminous roads now in use, plant layout and construction details, analysis of specifications and study of current literature on maintenance, renewals and surface treatments, laboratory tests of asphalts, tars, and oils.

740. Highway Laboratory. Two credit hours. Spring Quarter. Two three-hour laboratory periods each week. Prerequisite, Civil Engineering 739. Mr. Sloane.

Testing of mineral road materials, such as brick, stone, slag, sand, gravel, etc. Testing of soils for subgrade construction, instruction in sampling, and study of specifications governing tests.

741. Highway Design and Construction. Three credit hours. Spring Quarter. One recitation, two three-hour laboratory periods, and two hours of preparation each week. Prerequisite, Civil Engineering 738. Mr. Sloane.

Study of subgrade roads, drainage and drainage structure for subgrade, ditches and culverts. Construction details and plant layout for concrete, brick, broken stone, and traffic bound roads. Analysis of specifications and study of current literature on widening, rebuilding and maintenance of hard-surface roads. Stage and traffic bound construction.

750. Advanced Reinforced Concrete Design. Three credit hours. Winter Quarter. Three lectures and six hours of preparation each week. Prerequisite, Civil Engineering 701 or 713. Mr. Shank.

Design of complex reinforced concrete systems.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Civil Engineering. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

CLASSICAL LANGUAGES AND LITERATURE

Office, 217 Derby Hall

PROFESSORS OGLE†, HODGMAN, ELDEN, AND BOLLING, ASSISTANT PROFESSOR TITCHENER, MR. HOUGH

GREEK

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Courses 601 and 610 require a course in elementary Greek. There are no prerequisites for 650, 651, 652, and 701 other than the permission of the instructor. For 650, 651, and 652 a knowledge of Greek is not required.

601. Reading and Lectures. Three to five credit hours. One Quarter. Winter and Spring. Three to five meetings each week. Mr. Bolling, Mr. Titchener.

Study of the language, style, and works of some author or group of authors, chosen to meet the particular needs of the class. The course may consequently be repeated.

610. Private Reading and Minor Problems. Two to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Bolling, Mr. Titchener.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

*611. Athenian Public Life. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Titchener.

A brief study of the development of Athenian governmental institutions.

*650. Greek Art. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Bolling.

Description and discussion of the monuments of the pre-historic period—the civilization of Crete and Mycene.

*651. Greek Art. Three credit hours. Winter Quarter. Three lectures each week. Mr. Bolling.

The history of Greek vase painting.

*652. Greek Art. Three credit hours. Spring Quarter. Three lectures each week. Mr. Bolling.

The history of Greek sculpture.

701. Principles of the Historical Study of Language. Three credit hours. Spring Quarter. Three lectures each week. Mr. Bolling.

The elements of linguistic science together with an outline of the Indo-European family of languages.

720-721-722. Historical Greek and Latin Grammar. Three credit hours each Quarter. Autumn, Winter, and Spring Quarters. Prerequisite, ten credit hours of advanced work in the classics. Mr. Bolling.

NOTE: This course is the same as Latin 720-721-722.

* Not given in 1932-1933.
† Absent on leave, 1932-1933.

LATIN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in Latin in addition to any prerequisites stated in the description of the courses. As a rule, six Quarters of college Latin fulfills the Latin prerequisite. For courses 620, 621, 622, 623, 624, and 631 the prerequisite is one reading course more advanced than Latin Comedy.

602. Latin Satire. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Elden.

Selections from the Satires of Horace or Juvenal.

***605. Legal Latin.** Three credit hours. Spring Quarter. Three recitations each week. Mr. Titchener.

Selections from writers on the Roman Law.

***609. Historical Latin Grammar: Inflections.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Hodgman.

Sounds and inflections, and other topics essential to the understanding of the principles which govern the development of the Latin language. Latin 609 is deemed essential for those graduate students who specialize in Latin and is recommended for advanced undergraduate study.

***610. Roman Religion.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Hodgman.

Lectures on the development of Roman religion, with readings from the Fasti of Ovid. This course is valuable as supplementing the courses on the life and literature of the Romans.

***611. Roman Public Life.** Three credit hours. Winter Quarter. Three meetings each week. Prerequisite, four Quarters of college Latin. Mr. Titchener.

Lectures and readings in Latin authors illustrating the development of Roman governmental institutions, with special attention to their functions and character during the late republic and early empire.

612. Latin Prose Composition: First Course. Three credit hours. Winter Quarter. Three recitations each week. Mr. Hodgman.

Exercises and lectures on Latin idiom and style.

613. Latin Prose Composition: Second Course. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Latin 612. Mr. Titchener.

A continuation of Latin 612.

***614. Latin Prose Composition: Advanced Course.** Three credit hours. One Quarter. Three recitations each week. Prerequisite, Latin 613. Mr. Hodgman.

A study of the more difficult points of Latin idiom and style.

615. Proseminary, I. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Elden.

Lectures on topics suggested by the study of Caesar and Cicero. Roman writing and Roman writing materials; readings from the Letters of Cicero. Latin 615 is designed especially for students preparing to teach Latin.

* Not given in 1932-1933.

616. Proseminary, II. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Elden.

Lectures on the life and works of Vergil, and his influence on modern literature; readings from the Eclogues and the Georgics. Latin 616 is designed especially for students preparing to teach Latin.

620. Roman Elegy. Three credit hours. Autumn Quarter. Mr. Hough.

***621. Roman Tragedy.** Three credit hours. Autumn Quarter. Mr. Ogle.

622. Plautus. Three credit hours. Winter Quarter. Mr. Hough.

***623. Advanced Reading Course in the Post-Augustan Epic.** Three credit hours. Spring Quarter. Mr. Ogle.

624. Advanced Reading Course in Tacitus. Three credit hours. Spring Quarter. Mr. Elden.

***625. Advanced Prose Composition.** Three credit hours. Autumn Quarter. Prerequisite, Latin 612 and 613, or their equivalent. Mr. Ogle.

626. Paleography. Three credit hours. Winter Quarter. Prerequisite, three Quarters of college Latin. Mr. Elden.

Study of the different styles of writing. Textual criticism based largely on Latin manuscripts.

627. Vulgar Latin. Three credit hours. Winter Quarter. Prerequisite, six Quarters of college Latin, or French 801, or the consent of the instructor. Mr. Hodgman.

Lectures and the study of texts and inscriptions illustrating the development of the popular speech.

***629. History of Literary Tradition.** Three credit hours. One Quarter. Mr. Ogle.

Lectures and discussions dealing with the genesis and development of literary forms and motifs and their tradition down to the rise of modern literatures. The course will be so conducted that students of literature generally will be welcome.

***630. Cicero's Political Philosophy.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Titchener.

Lectures and readings in Cicero's *de re publica* and *de legibus* illustrating his theory of the state, with attention paid to his sources and to his influence.

631. Private Reading and Minor Problems. Two to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Titchener, Mr. Hough.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

650-651-652. History of Roman Literature. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, three reading courses more advanced than Latin comedy. Mr. Titchener.

Lectures and assigned reading in literary histories on the development of Roman literature; required and suggested passages for translation in each author studied: brief weekly reports.

* Not given in 1932-1933.

720-721-722. Historical Greek and Latin Grammar. Three credit hours each Quarter. Autumn, Winter, and Spring Quarters. Prerequisite, ten credit hours of advanced work in the classics. Mr. Bolling.

NOTE: This course is the same as Greek 720-721-722.

NOTE: TEACHING COURSES. For the Teaching Courses in this department see the Department of Principles of Education, Courses 730 and 731. Course 731 may be counted as part of a major or minor in Latin.

FOR GRADUATES

Prerequisites for Graduate Work: For admission to graduate courses the student must have had at least two years of work in undergraduate courses. No student will be considered as a candidate for the Master's degree unless his program includes at least two courses exclusively for graduates.

Graduate courses will be offered in the Classical Languages and Literature, Life, and Archaeology.

Candidates for advanced degrees will be required to have:

(a) Some knowledge of language as such and of the place held in the history of linguistic development by the Classical Languages. To attain this end, all candidates must have at least one course in General Linguistics (Greek 701).

(b) A knowledge of Classical Literature in its broad outlines.

(c) An understanding, in a general way, of the principles of textual criticism, and as a means to this end, some knowledge of Paleography.

Candidates for the Doctorate will be required to attain such mastery of their major language as will enable them to express themselves in it and to interpret any document in that language set before them. Similar but less difficult tests, will be applied to candidates for the Master's degree; the passages set before them for interpretation will be selected from some particular field in which they have already worked.

Candidates for the Doctorate who make one of the Classical Languages their major, must take in the other language one course, at least, from the intermediate group (600) except that Greek 650, 651, 652 cannot be used to satisfy this requirement.

For the year 1932-1933, graduate students majoring in Latin should include in their work the following courses. Autumn Quarter: Latin 650, History of Roman Literature; Latin 806, Seminary in the Latin Satire; Greek 720, Historical Greek and Latin Grammar. Winter Quarter: Latin 651, History of Roman Literature; Latin 626, Paleography; Latin 612, Prose Composition; Greek 721, Historical Greek and Latin Grammar. Spring Quarter: Latin 652, History of Roman Literature; Latin 809, Seminary in Latin Philosophical Writers; Latin 613, Prose Composition; Greek 722, Historical Greek and Latin Grammar; Greek 701, General Linguistics.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

***801. Seminary in the Latin Epic.** Three credit hours. Autumn Quarter. Mr. Ogle.

Research problems based upon the fragments of the early Epic. Lectures on the Greek background of the Latin Epic. The Latin Epyllion.

***802. Seminary in the Latin Epic (Continued).** Three credit hours. Winter Quarter. Mr. Ogle.

The Aeneid of Vergil will form the center of study and discussion.

***803. Seminary in the Post-Augustan Epic.** Three credit hours. Spring Quarter. Mr. Ogle.

Study and discussion of the Pharsalia of Lucan and the Argonautae of Valerius Flaccus. Lectures on the later traditions of the Epic.

* Not given in 1932-1933.

***804. Seminary in the Latin Lyric.** Three credit hours. Autumn Quarter. Mr. Ogle.

Research problems based upon the Greek background of the Latin lyric and upon the poetry of Catullus and Horace.

***805. Seminary in the Latin Lyric (Continued).** Three credit hours. Winter Quarter. Mr. Ogle.

Lyric poetry in the later Empire and Medieval period.

806. Seminary in the Latin Satire. Three credit hours. One Quarter. Autumn and Winter. Mr. Titchener.

The works of Horace and Juvenal will form the center of study and discussion.

***807. Seminary in Latin Historiography.** Three credit hours. One Quarter. Autumn and Winter. Mr. Ogle, Mr. Titchener.

Study and discussion will be based upon the works of Livy and Tacitus.

†808. Seminary in the Latin Drama. Three credit hours. One Quarter. Autumn and Winter. Mr. Ogle.

The plays of Plautus and Terence will form the center of study and discussion, but part of the course will deal with the tragedies of Seneca and with their importance in the history of dramatic literature.

809. Seminary in the Latin Philosophical Writers. Three credit hours. Spring Quarter. Mr. Titchener.

The works of Lucretius, Cicero, and Seneca will form the center of study and discussion.

***810. Seminary in Classical Archaeology.** Three credit hours. Spring Quarter. Mr. Elden.

The work of the course will center around the study of the archaeological remains of classical antiquity.

COMPARATIVE LITERATURE AND LANGUAGE

Courses formerly offered under the above heading will be found under the Departments of Classical Languages and Literature, and German.

DAIRY TECHNOLOGY

Office, 111 Townshend Hall

PROFESSOR STOLTZ, ASSOCIATE PROFESSOR BURGWALD, MR. ERB

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in dairying and the consent of the instructor. Course 602 requires also a fundamental course in animal husbandry. Courses 608, 609, and 610 require a course in bacteriology. Other prerequisites are stated in the descriptions of courses to which they apply.

605. Management of Dairy Plants. Three credit hours. Winter Quarter. Two lectures and one recitation each week. Prerequisite, Dairy Technology 607, 608, and 610. Mr. Stoltz.

Lectures will be given on the organization, construction, and operation of milk plants, creameries, cheese factories, condenseries, and ice cream plants. The purchasing of milk and milk products by various methods, the importance of sanitation, employing of help, and the purchasing of supplies will be discussed. A trip to visit small and large plants is required.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

607. Market Milk. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, Bacteriology 607, 610, 611. It is also desirable that students taking this course should have credit for dairy chemistry. Mr. Burgwald.

Lectures and assigned readings will be given on the handling and distribution of milk for city trade including cooling, clarifying, standardizing, pasteurizing, and bottling milk and cream and methods of determining the bacterial and leucocyte count in milk in order to comply with the regulations laid down by the various city ordinances. Laboratory will consist of practical work in handling and processing milk and the operation of the milk plant. Training and practice will be given in milk inspection from the standpoint of the Board of Health and the city milk plant.

Not open to students who have credit for Dairying 404.

608. Hard Cheese Manufacturing. Five credit hours. Winter Quarter. One lecture, one recitation, and two four-hour laboratory periods each week. Mr. Stoltz.

Lectures will take up the methods of manufacturing cheddar, Swiss, brick, and Limburger cheese, the method of paying for milk at cooperative cheese factories and the scoring of American cheese. Laboratory work will consist of the making of cheddar cheese from both raw and pasteurized milk, Swiss cheese by the use of the eye-forming culture, brick, Limburger, and farm cheese.

Not open to students who have credit for Dairying 408.

609. Condensed Milk and Milk Powders. Three credit hours. Autumn Quarter. One lecture, one quiz, and one three-hour laboratory period each week. Mr. Erb.

Lectures will be given on the theory and practice of milk condensation and milk drying. Special emphasis will be given to the questions of heat stability of milk, the salt balance, and lactose crystallization Laboratory work will consist of practical work with the operation of vacuum pans, sterilization of milk, and visits to milk condenseries and powder plants in the vicinity of Columbus.

Not open to students who have credit for Dairying 409.

610. Ice Cream Manufacturing. Five credit hours. Autumn Quarter. Two lectures, one recitation, and two three-hour laboratory periods each week. Concurrent, Dairy Technology 609. Mr. Erb.

Lectures will be given on the theory and practice of ice cream making. Laboratory work will consist of preparing the ice cream mix, standardizing and freezing. Class will visit the various ice cream manufacturing plants.

Not open to students who have credit for Dairying 410.

615. Dairy Products Judging. Three credit hours. Autumn Quarter. One lecture and two two-hour laboratory periods each week. Mr. Stoltz.

An advanced class for Seniors who are majoring in dairy technology and who desire to take up judging of milk, butter, ice cream, and cheese in the commercial field.

701. Special Problems. Three to fifteen credit hours, taken in units of three to five hours each Quarter, for one or more Quarters. Autumn, Winter, Spring. Mr. Stoltz.

This course is designed for students majoring in Dairy Technology and consists in working out special problems along the lines in which they are specializing.

FOR GRADUATES

Prerequisite for Graduate Work: Major work in this department should embrace as general prerequisites, the courses pertaining to the fundamental principles of Dairy Technology, namely: chemistry; physics; bacteriology; mathematics; economics; testing

of dairy products; the manufacturing of market milk, ice cream, butter, cheese and condensed milk.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Dairy Technology. Five to ten credit hours. Autumn, Winter, and Spring Quarters. One hour conference each week. Prerequisite, at least twenty hours of work in the department and the consent of the instructor. Mr. Stoltz.

Research work in Dairy Technology is conducted under the supervision of Mr. Stoltz, Mr. Burgwald, and Mr. Erb. Any apparatus or equipment on hand will be furnished and room will be arranged for those desirous of studying problems pertaining to market milk, ice cream, butter, cheese, evaporated milk, milk powder, buttermilk, or other dairy products. Students desiring to work on some problems, such as plant management, dairy bacteriology, dairy chemistry, nutrition, costs accounting, can arrange to carry on the work as though it were in one department and college.

DRAWING

(See Engineering Drawing)

ECONOMICS

Office, 116 Commerce Building

PROFESSORS WOLFE, HAMMOND, HAYES, WALRADT, HOAGLAND, MARK, DICE, AND HELD, ASSOCIATE PROFESSOR ZORBAUGH, ASSISTANT PROFESSORS SMART, BOWERS, DEWEY, JAMES, AND WILLIT, MISS STITT, MISS HERBST, MR. ROWNTREE, MR. WHITSETT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in economics in addition to any prerequisites stated in the description of the courses. For 644 a fundamental course in sociology may be offered in place of economics.

601-602-603. Principles and Problems of Economics. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Hayes.

A general course covering the entire field of economics. The scope of the work is the same as in Economics 401-402, but the lectures, readings, and recitations are adapted to the needs of more mature students.

Not open to students who have credit for Economics 401-402.

607-608. Financial History of the United States. Three credit hours. Autumn and Winter Quarters. Mr. Walradt.

A study of the fiscal and monetary history of the country from colonial times to the present, with special reference to federal taxation, loans, and financial administration, currency, legislation, and the development of banking institutions.

616. Corporation Economics. Five credit hours. Autumn Quarter. Two lectures and three quiz periods each week. Mr. Hoagland.

This course is designed especially to meet the needs of students outside of the College of Commerce and Administration who desire an introduction to the forms of business organization and to the financial problems of corporations. Attention will be given also to public regulation and control of corporations.

Not open to students who have credit for or who are taking Business Organization 650.

618. Transportation Economics. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Dewey, Mr. Rowntree, Mr. Whitsett.

A general survey of the history and regulation of inland transportation agencies including highways, waterways, airways, and electric and steam railways. Problems of

ratemaking, valuation, discrimination, consolidation, financing, service, terminals, labor relations, and government ownership and operation. The development and present status of state and federal regulation of transportation. This course is designed to meet the needs of students interested in various fields of economics and commerce as well as for students with a special interest in the field of transportation.

624. Principles of Insurance. Three credit hours. Autumn Quarter. Three lecture and discussion periods each week. Mr. E. L. Bowers.

Risk; types of hazards; prevention of loss; fundamentals of insurance contracts; the fire insurance contract; burglary, robbery and theft insurance; other property insurance contracts; life insurance; kinds of policies and uses; special forms of life insurance; accident and health insurance contracts; liability insurance; fidelity and surety bonds; automobile insurance. Types of companies; insurance sales and home office organizations; the problem of loss adjustments; financial aspects of the insurance organizations; state supervision.

625. Business Cycles. Two credit hours. Autumn Quarter. Mr. Dewey.

A general survey of the price system and price theory with special reference to changes in price levels and their causes. Past and current theories of business cycles. The stages in the course of business cycles, noting the movement of commodity prices, interest rates, profits, the volume of production, and wages and employment. The economic and social results of business fluctuations. Various methods of controlling cycles.

626. Business Forecasting. Two credit hours. Winter Quarter. Prerequisite, Economics 625 and a course in elementary economic statistics. Preferably preceded or accompanied by a course in money and banking. Mr. Dewey.

The nature and importance of business forecasting. A non-technical discussion of the methods of forecasting. Examination of existing "barometers." Analysis of the outlook for general business as well as for selected industries. An appraisal of the results of business forecasting.

631. Public Finance. Three credit hours. Autumn Quarter. Mr. Walradt.

A study of the problems connected with the debts, expenditures, revenues, and fiscal administration of national, state, and municipal governments.

632. Public Finance. Three credit hours. Winter Quarter. Prerequisite, Economics 631. Mr. Walradt.

A continuation of Economics 631.

633. Public Finance. Three credit hours. Spring Quarter. Prerequisite, Economics 632. Mr. Walradt.

A continuation of Economics 632.

634-635. International Finance. Three credit hours. Autumn and Winter Quarters. Mr. James.

Critical analysis of classic and contemporary theories of the financial interrelations of nations. Special problems, such as the Franco-German indemnity of 1871, Canadian borrowing 1900-1913, German reparations and inter-allied debts, the export of capital. The effect of the rationalization of industry and of political changes in the Orient on future trade relations. The problem of the international control of raw materials. Financial relations with backward countries. Throughout the course the broader aspects and implications of international financial relations are emphasized.

636. Industrial Development of Modern Europe. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite or concurrent, a college course in the principles of economics. Mr. Smart.

A survey of the economic changes which have taken place among the advanced

industrial nations of Europe since the close of the Seven Years War. Special emphasis is placed on the Industrial Revolution, the growth of the factory system and the accompanying changes in banking, transportation, labor and industrial combinations.

Not open to students who have credit for Economics 412 or 512.

637. Industrial Relations. Five credit hours. Autumn Quarter. Miss Herbst.

A study of the origin, evolution, and character of present-day labor conditions and problems. The history, structure, government, philosophy and methods of organized labor and of employers' associations and employee representation in industry. Industrial disputes and modes of settling them; mediation, conciliation, and arbitration. Government intervention and its success at home and abroad.

638. Labor Legislation. Three credit hours. Winter Quarter. Prerequisite, Economics 637. Miss Stitt.

Efforts on the part of government to improve the condition of the laboring class and to increase the bargaining power of labor. The theory of the legal regulation of labor; legislation and court decisions. Child labor and its legal prohibition or restriction. The legal regulation of the employment of women in industry. The problem of low-paid labor and the legal minimum wage. The working day and the legal regulation of hours of labor. Efforts to secure by law safe and sanitary conditions for workers in factories, tenements, mines, and in transportation. The administration of labor laws.

639. Social Insurance. Three credit hours. Spring Quarter. Prerequisite, Economics 637, 638, or 624. Mr. Bowers.

Recent efforts at home and abroad to guarantee to the worker financial security against the hazards of industry. Accident insurance; employers' liability and workmen's compensation. Industrial health hazards and health insurance. Old age and invalidity insurance or pensions. The problem of unemployment and its prevention. Employment agencies, private and public. The regularization of employment; unemployment insurance. Compulsory automobile insurance.

643. Women in Industry. Four credit hours. Spring Quarter. Four recitations each week. Miss Stitt.

A study of the economic position of women. Social, industrial, and legislative problems created by their entrance into the field of industry. A survey of the occupations open to trained women.

644. The Standard of Living. Three credit hours. Spring Quarter. Three recitations each week. Miss Mark.

A consideration of the content of the various standards of living in American society, their economic and social significance. Problems in family budgets and retail buying.

645. Principles of Economic Consumption. Three credit hours. Winter Quarter. Miss Zorbaugh.

A survey of economic thought on consumption. Relations of economic consumption to general culture and welfare. Factors conditioning consumption. Survey of some aspects of actual consumption. Specific problems of the progress of economic consumption.

648. Public Utility Economics. Five credit hours. Autumn Quarter. Five meetings each week. Mr. Dewey.

A course complementary to Economics 618, with special emphasis on local public utilities, including water, gas, electric light and power, telephone and telegraph, urban and interurban railway, and other local utilities. The economic and legal aspects of public utility service. The relations of public utility companies to local, state, and federal governments. The history and present status of regulation and the leading problems arising therefrom, including conflicts of jurisdiction, supervision of holding companies, valuation and the fair rate of return, reasonableness of rates, adequacy and economy of service, and control of accounts and financing. Public ownership and operation versus public regulation.

651. International Commercial Policies. Three credit hours. Spring Quarter. Mr. Held.

The theory of international trade; historic policies; mercantilism; free trade and protection. A study of the tariff policy of the United States with a comparative study of the policies of other countries. International trade as affected by the World War.

656. The Distribution of Wealth and Income. Three credit hours. Autumn Quarter. Mr. Hayes.

The economic wealth and income of the nation; the division of ownership and income among persons; the theories of various writers concerning this division, including analyses of the pricing process by which wages, interest, rent and profit are determined; and proposals to alter the present division of wealth and income by taxation and other methods.

657. Socialism. Three credit hours. Spring Quarter. Mr. Hayes.

A critique of the present economic system and of the leading plans proposed as substitutes for it, including state socialism, syndicalism, and guild socialism, with a view to determining their relative merits and defects. Special attention is given to the revolutionary movements abroad.

658-659-660. Population. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Wolfe.

A general survey of the facts and problems of the growth and distribution of population. The relation of numbers to resources, productive capacity, standard of living, and prosperity. Population in relation to international economic problems. The dynamic aspects of population in relation to material and moral progress. Critical consideration of population theories and policies.

FOR GRADUATES

Prerequisite for Graduate Work: Candidacy for an advanced degree presupposes good foundation courses of collegiate grade in the principles of economics, political science, psychology, European and American history.

Master's Degree: The general requirements for this degree are stated on pages 34-39 of this bulletin.

The candidate for the Master's degree in economics will be examined (1) on the general principles of economics, for which a preparation equivalent to that afforded by Economics 601-602-603 as described in this Bulletin is necessary; (2) on the history of economic thought for which Economics 801-802-803, or its equivalent is necessary; (3) on elementary statistics, which, if it has not been taken as an undergraduate, may be obtained by taking Economics 807. The candidate must write a thesis. He must complete, including the above, fifteen hours each Quarter for three Quarters, the selection of the courses to be approved by the professor in charge of his thesis.

Doctor's Degree: The general requirements for this degree are stated on pages 39-42 of this bulletin.

The candidate for the Doctor's degree in economics should have a broad and liberal training, such as will enable him to approach his work in a scientific, critical, and constructive spirit; and from a broad social point of view rather than from that of a narrow special interest. In order to secure this point of view, he should have gained familiarity, either through his undergraduate courses and those of his first year's graduate work or through intensive reading, with the progress which has been made not only in economics but in the other social sciences, as well as in philosophy and psychology. A reasonable acquaintance with European and American history is presupposed. In certain lines of work in economics, related courses in Business Organization should be elected. For advanced economic statistics, a knowledge of mathematics through the differential and integral calculus is desirable; for some other lines of work a knowledge of accounting; and for others a knowledge of anthropology and social psychology will be found desirable.

The more specific requirements for the Doctor's degree in economics include the following:

(1) The requirements for the Master's degree as given above;

(2) Modern economic theories equivalent to at least course 816-817-818 as described in this Bulletin;
(3) A dissertation in the field of the candidate's major interest;
(4) A high degree of specialization in one of the following fields and adequate preparation in at least three of the others;
  (a) Economic theory;
  (b) Economic history, European and American;
  (c) Statistics;
  (d) Labor problems and legislation;
  (e) Money and banking;
  (f) Public finance;
  (g) International trade and finance;
  (h) Corporation problems and government regulation of industry;
  (i) Transportation and public utilities;
  (j) Marketing;
  (k) Population and standard of living;
(5) One or more subjects taken in other departments of the university, selected with the approval of the professor in charge of the candidate's thesis.

The doctoral dissertation will be expected to show an ability to collect, present and interpret the material handled in such a way as to make a real contribution to the literature of the subject.

A reading knowledge of French and German is required of all candidates for the doctor's degree in economics. Candidates who are not prepared to pass the examination in these subjects by the time they enter upon their second year's work in the Graduate School must so arrange their schedules as to prepare themselves for this examination. If they have had at least one year's training in each of these languages, they will find it to their advantage to register in Economics 819-820-821 (French and German Economics).

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. History of Economic Thought. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Hammond.

An account of the development of economic ideas and principles in the Western World with the purpose of showing how they were the outgrowth of the economic and political conditions of the times in which they originated and the extent to which they have found acceptance by present-day economists. The works of the leading writers in each period are read and discussed in class.

804-805-806. Economic History of the United States. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Hammond.

The development of agriculture, trade, transportation, and manufactures from the comparatively simple system of colonial days to the complex economic organization of the present. The course endeavors to point out the interrelation which exists between this development and such problems as the tariff, merchant marine, commercial crises, labor, currency, and banking conditions.

Not open to students who have credit for Economics 661-662-663.

807-808-809. Statistical Analysis. Two credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, permission of the instructor. Mr. Smart.

A general course in statistical methods designed primarily to give the graduate student in economics, who intends to enter into the statistical field, a clear conception of the value of statistics to economics and business. The course will include a treatment of the methods of collection, tabulation and graphic representation of data, of analysis of statistical series of various kinds together with an interpretation of the measures used and of the final results. Some time will be devoted to the work being done by American, English and Continental writers in the field of statistical method. Economics 807 will meet the requirements of those students who desire only a brief survey of statistical analysis.

812-813-814. The Economic History of Western Europe. Two credit hours. Autumn, Winter, and Spring Quarters. Preferably preceded or accompanied by Economics 801-802-803. Mr. Smart.

A general survey from the fall of the Roman Empire to the Great War. A brief preliminary survey of the economic history of Greece and Rome. Especial attention is given to the interrelations between the economic institutions, the general culture, and the economic thought of the various periods. The development of modern capitalism. Economic background and social consequences of the Industrial Revolution. The economic causes and implications of modern European nationalism. The method of the course is comparative and analytical rather than chronological. A reasonable general knowledge of European History is presupposed. Courses in Medieval and Modern European History and in the History of Political Theory are desirable accompaniments of this course.

815. Costs and Returns. Three credit hours. Spring Quarter. Mr. Wolfe.

Critical and constructive analysis of the conditions which determine costs of production. Types of cost. Differences and changes in costs. The intricacies of the relation of cost to value. Critical consideration of the history of the theory of costs and returns.

816-817-818. Modern Economic Theories. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Wolfe.

A course designed to acquaint the student with the contributions to theory of the chief economic writers of the last half-century and to examine analytically and critically modern theories of value and distribution.

819-820-821. French and German Economics. Two credit hours. Autumn, Winter, and Spring Quarters. Open to graduate students who have had not less than one year's training in French and the same amount in German. Mr. Held.

A study of selected works of French and German economists of the last half-century. Students who expect to take the examination for the Doctor's degree will find this course a valuable aid in acquiring a reading knowledge of French and German.

822-823-824. Seminary in Economics and Statistics. No credit. Autumn, Winter, and Spring Quarters. All instructors.

Graduate students and the instructors in the department will meet regularly for the presentation of the results of investigation, and the discussion of current problems.

†825. Current Taxation Problems. Two credit hours.

A critical analysis of the taxation problems now before the federal, state, and local governments. Particular attention will be given to the various types of sales taxes.

863. Advanced Money. Three credit hours. Autumn Quarter. Preferably preceded by a course in Money and Banking. Mr. Dice.

This course is a study of the gold standard; the gold exchange standard; the role of money in the economic organization; an analysis and criticism of the leading types of monetary theory; and the methods of stabilizing the price level.

Not open to students who have credit for Economics 611.

864. Advanced Banking. Three credit hours. Winter Quarter. Three discussion periods each week. Prerequisite, a course in Money and Banking. Mr. Dice.

The integration of the financial institutions in our economic organization; the theories underlying bank deposits; the theories of the elasticity of bank currency; the discount policy and the interest rate of the different central banks; the effectiveness of the different methods of regulating credit in stabilizing the price level and business activities.

Not open to students who have credit for Economics 612.

† Not given during the academic year, 1932-1933.

865-866-867. Public Control of Industry. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Dewey.

A study of the underlying conceptions and conditions of control, the general instruments of control, and the safeguarding of consumers against exploitation. Attention is directed to the legal and constitutional background of control, as well as to each of several important fields including railroads, public utilities, trusts and combinations, labor, banking, foreign trade and trade associations. Examination of various proposals for economic planning.

***868. Problems of Capital Accumulation and Utilization.** Three credit hours. Mr. Hayes.

An analysis of the doctrines of economists and other writers concerning the problems of capital accumulation and utilization with especial attention to economic "progress," oversaving, thrift, industrial depressions, inequality of wealth, and the export of capital.

***869. Capitalism and Communism in Europe and America.** Three credit hours.

An analytical comparison of the economic and social system of capitalism with that of socialism in contemporary Europe and America.

†870. European Banking Systems. Two credit hours.

A survey of the organization of the central banking and commercial banking systems of the leading European countries, together with a study of the leading problems of credit policy and banking administration which have arisen since the post-war stabilization of various currencies.

900. Economic Research. Three to ten credit hours. Autumn, Winter, and Spring Quarters.

With the advice and guidance of an appropriate member of the staff of the Department of Economics, suitably qualified graduate students may carry on research in selected fields. Research in economic theory may be pursued under the direction of Mr. Hammond, Mr. Hayes, or Mr. Wolfe; in economic history under Mr. Hammond or Mr. Smart; in labor problems under Mr. Hammond, Miss Stitt, Mr. Bowers, or Miss Herbst; in money and banking under Mr. Bowers or Mr. Willit; in economic cycles under Mr. Dewey; in public finance under Mr. Walradt; in corporation economics under Mr. Hoagland; in transportation under Mr. Dewey or Mr. Duffus; in public utilities under Mr. Duffus or Mr. Dewey; in international trade under Mr. Held; in international finance and world economics under Mr. James; in population problems under Mr. Wolfe; in statistics under Mr. Smart or Mr. Dewey.

Attention of research students in economics is called to the fact that the Bureau of Business Research is frequently in position to cooperate in the furnishing of needed data and in advice as to method of procedure where business data are involved.

ELECTRICAL ENGINEERING

Office, 171 Robinson Laboratory

PROFESSORS DREESE AND CALDWELL, ASSOCIATE PROFESSORS BIBBER AND EVERITT, ASSISTANT PROFESSORS SHEPARDSON AND KIMBERLY, MR. TANG, MR. BYRNE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in mathematics and physics, and the permission of the instructor, in addition to any prerequisites stated in the description of the courses.

601. Direct Current Apparatus. Five credit hours. One Quarter. Summer and Spring. Three class hours and three laboratory hours each week. Prerequisite, Mechanics 601.

Generators and motors; a study of their theory, construction, and operation.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

605. Alternating Current Circuits. Five credit hours. One Quarter. Summer and Autumn. Three class hours and three laboratory hours each week. Prerequisite, Mechanics 601. Mr. Tang.

Inductance, capacity, reactance, impedance, series and parallel circuits, power, power factor, polyphase systems. Complex notation.

607. Applied Electronics. Four credit hours. One Quarter. Autumn and Winter. Three class hours and two laboratory hours each week. Prerequisite, Electrical Engineering 605. Mr. Byrne.

An elementary study of electronic phenomena, electronic devices, and their application to electrical engineering.

611. Medium and High Frequency Currents. Five credit hours. One Quarter. Winter and Spring. Three class hours and one three-hour laboratory period each week. Prerequisite, Electrical Engineering 605. Mr. Everitt.

General analysis of alternating current circuits under wide ranges of frequency and impedance conditions. Network theorems, resonance phenomena, vacuum tube amplifiers, and a study of the conversion between mechanical or acoustical energy and electrical energy over wide frequency ranges. Alternating current measurements at medium and high frequencies.

612. Audio Frequency Alternating Current Circuits and Measurements. Four credit hours. Autumn Quarter. Three class hours and one three-hour laboratory period each week. Not open to students in Electrical Engineering. This course is designed for advanced students in non-electrical courses, who find need for electrical methods in the wide range of their application to physical measurements. To be elected only with the consent of the student's faculty adviser and the instructor in charge. Prerequisite, fundamental courses in physics and mathematics through trigonometry. Mr. Everitt.

An elementary treatment of alternating currents, and the circuits used in their control and distribution throughout the audio frequency range. Telephone transmitters and receivers. Vacuum tube amplifiers, the causes of distortion and methods by which such distortion can be reduced to a minimum. The use of resonant circuits and filters.

630. Electrical Engineering. Five credit hours. Winter Quarter. Three class hours and three laboratory hours each week. Mr. Caldwell, Mr. Shepardson.

Electrical circuits, machinery, and transmission, with particular reference to the operation of electrical machinery.

635. Electrical Equipment. Three credit hours. Spring Quarter. Two class hours and two problem hours each week. Prerequisite, Electrical Engineering 630. Mr. Caldwell, Mr. Shepardson.

The layout and cost of electrical equipment.

640. Electrical Engineering. Two credit hours. Winter Quarter. Two class hours each week. Mr. Shepardson.

The elementary theory of direct and alternating current circuits, generators, motors, and other equipment.

641. Electrical Engineering. Five credit hours. Spring Quarter. Two class hours and two three-hour laboratory periods each week. Prerequisite, Electrical Engineering 640. Mr. Shepardson.

Theory, operating characteristics, and applications of direct and alternating current generators, motors, and other equipment.

661. Electrical Engineering Survey. One-half credit hour. Autumn Quarter. One class hour each week. Mr. Dreese.

A course of lectures designed to give electrical engineering students some insight into other fields of thought.

701. Alternating Current Apparatus. Three credit hours. One Quarter. Autumn and Winter. Three class hours each week. Prerequisite, Electrical Engineering 601 and 605 or 775 and 776; concurrent, Electrical Engineering 705. Mr. Dreese.

Theory of transformers, induction motors, and related apparatus.

702. Alternating Current Apparatus. Three credit hours. One Quarter. Autumn and Winter. Three class hours each week. Prerequisite, Electrical Engineering 601 and 605 or 775 and 776; concurrent, Electrical Engineering 706. Mr. Caldwell.

Theory of alternators, synchronous motors, converters, and other apparatus.

705. Alternating Current Laboratory. Four credit hours. One Quarter. Autumn and Winter. Five laboratory hours each week. Concurrent, Electrical Engineering 701.

Laboratory study of transformers and induction motors.

706. Alternating Current Laboratory. Four credit hours. One Quarter. Autumn and Winter. Five laboratory hours each week. Concurrent, Electrical Engineering 702.

Laboratory study of alternators, synchronous motors, and converters.

710. Electric Railways. Four credit hours. Autumn Quarter. Three class hours each week. Prerequisite, Electrical Engineering 601 or equivalent. Mr. Shepardson.

A study of railway operation and the application of electric motors to train propulsion. Traffic studies, electric motor characteristics, and control system. Speed-time and other performance curves. Railway power distribution. Electric traction systems. Locomotive train haulage and the application of electric traction to trunk line railways.

716. Communication Engineering. Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 611. Mr. Everitt.

Study of circuits with reference to their action at medium and high frequencies, electric filters, loading, theory of propagation of waves over long circuits, inductive interference and bridge circuits.

Not open to students who have credit for Electrical Engineering 715.

717. Communication Engineering. Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 716. Mr. Everitt, Mr. Byrne.

Coupled circuits, impedance matching networks, and the use of vacuum tubes as oscillators, amplifiers and detectors at medium and high frequencies.

Not open to students who have credit for Electrical Engineering 725.

720. Electrical Illumination. Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. Mr. Caldwell, Mr. Tang.

Illumination, its development and present methods. Modern light-sources, and modification of light by reflectors, globes and other accessories. Light phenomena associated with illumination, such as reflection, transmission and absorption, direction and diffusion,

refraction and color. Infra-red and ultra-violet radiation. Applications of illumination of industrial work, buildings, street-lighting, aviation, light-projection, etc.

722. Electrical Illumination. Three credit hours. Autumn Quarter. Three class hours each week. Mr. Caldwell.

Modern lighting, both electric and daylight, especially as applied to buildings, such as industrial plants, stores, schools, residences, etc. A brief study of lamps and accessories and the phenomena of reflection, transmission, glare, diffusion, color, etc., as they affect illumination design. Circuits for electric lighting and their control.

723. Infra-Red, Visible, and Ultra-Violet Radiation and Its Applications. Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 720 or equivalent. Mr. Caldwell.

An advanced study of phenomena, visual and otherwise, connected with radiation within the range indicated, and its practical applications. This will include, over the whole range, spectrophotometry, eye sensitivity, reflection and transmission, selectivity, refraction; also fluorescence and other methods of detection.

726. Advanced Electrical Communication. Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 701, 702, and 717. Mr. Everitt, Mr. Byrne.

An advanced study of medium and high frequency alternating current circuits. Radiation fields and their measurement.

730. Electrical Design. Four credit hours. Winter Quarter. Six hours in calculation periods each week. Prerequisite, Electrical Engineering 701 or 702.

Design procedure and design theory of resistors, inductors, magnets, starters, regulators, direct-current generators and motors, alternating current transformers, etc., including mechanical and thermal problems; armature windings.

731. Advanced Electrical Design. Three credit hours. Spring Quarter. Two three-hour calculation periods each week.

A continuation of Electrical Engineering 730. Review of electrical, mechanical, chemical and thermal problems associated with dynamo design; windings. Design procedure and design theory of alternating current-apparatus, synchronous, asynchronous, commutator, transforming and regulating.

741. Electric Utilities Engineering. Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 601 and 605 or 775 and 776. Mr. Bibber.

Elementary principles of corporate finance, study of economic decay and tests for obsolescence, as applied to an electric power plant and distributing system; economic load division between units and plants, economic conductor section and distribution systems.

742. Electrical Transmission and Distribution. Three credit hours. Winter Quarter. Three class hours each week. Prerequisite, Electrical Engineering 701 or 702. Mr. Bibber.

The theory and operation of transmission and distribution systems and apparatus. Not open to students who have credit for Electrical Engineering 740.

746. Advanced Alternating Current Machinery. Five credit hours. Spring Quarter. Three class hours and five laboratory hours each week. Prerequisite, Electrical Engineering 701, 702, 705, 706.

Advanced theory and laboratory study of alternating current machinery. Not open to students who have credit for Electrical Engineering 745.

760-761-762. Advanced Theoretical Study of Electrical Engineering Practice and Equipment. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

765-766-767. Special Advanced Laboratory. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

770. The Application of Mathematics to Electrical Engineering Problems. Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 605. Mr. Tang.

The content will be selected from the following fields: complex and hyperbolic quantities, calculus, differential equations, Fourier series, Heaviside operators. The applications will be illustrated by examples from electrical engineering and related fields.

775. Electrical Engineering. Four credit hours. One Quarter. Autumn and Winter. Three class hours and three laboratory hours each week.

Characteristics and principles of operation of direct current generators, motors, control systems, and storage batteries.

Not open to students who are carrying or have credit for Electrical Engineering 601.

776. Electrical Engineering. Four credit hours. One Quarter. Autumn and Winter. Three class hours and three laboratory hours each week.

Alternating current circuits and their characteristics, operation, and applications of alternating current generators, motors, transformers, and other equipment.

Not open to students who are carrying or have credit for Electrical Engineering 605.

780. Engineering Field Problems. Two credit hours. Spring Quarter. Two class periods each week. Prerequisite, Electrical Engineering 701 and 702 or 775 and 776. Mr. Kimberly.

A study of technical and economic problems found in electrical engineering practice.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate work in electrical engineering presupposes the requisite foundation courses in mathematics, physics, and electrical measurements.

Graduate work will be given to individual students and groups under the course numbers given below. The following are the fields of special interest of the instructors listed. Other lines of study are, however, taken up under their supervision. Mr. Dreese, Electrical Machinery. Mr. Caldwell, Alternating Current Apparatus and Illumination. Mr. Bibber, Transmission and Distribution, Alternating Current Apparatus. Mr. Everett, Electrical Communication. Mr. Kimberly, Electrical Instruments, Alternating Current Apparatus. Mr. Shepardson, Electric Traction. Mr. Tang, Illumination, Electrical Mathematics. Mr. Byrne, Electronics, Electric Radiation.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Advanced Theoretical Study of Electrical Engineering Practice and Equipment. Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

805-806-807. Advanced Laboratory Study of Electrical Engineering Equipment. Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

811-812-813. Research Work. Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

NOTE: Detailed schedules of graduate studies available under the above course numbers may be obtained on application to the Department of Electrical Engineering.

821. Revolving Fields and Permeances in Electrical Machinery. Three credit hours. Autumn Quarter. Three class hours each week. Prerequisite, Electrical Engineering 701 and 702 or equivalent. Mr. Dreese.

An analysis of the various revolving and stationary fields found in electrical machinery. The origin and effects of both useful and parasitic fluxes are considered. Discontinuities and cusps in speed-torque curves of induction machines, synchronous-motor effects in induction machines, sub-synchronous speeds in induction and synchronous machines, and design for sub-synchronous operation are topics studied in this course.

822. Revolving Fields and Permeances in Electrical Machinery. Three credit hours. Winter Quarter. Three class hours each week. Mr. Dreese.

Continuation of Electrical Engineering 821.

831. Transmission Networks. Three credit hours. Winter Quarter. Three class hours each week. Prerequisite, Electrical Engineering 716. Mr. Everitt.

Generalized treatment of transmission networks. Reflection and interaction factors. Advanced design and computation of filter systems and equalizing networks. Inductive interference.

832. Electromagnetic Radiation and Radiating Systems. Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 717 or equivalent. Mr. Everitt.

Scalar and vector fields. Maxwell's equations, electromagnetic radiation and propagation, antenna systems.

ENGINEERING DRAWING
Office, 218 Brown Hall

PROFESSOR FRENCH, ASSOCIATE PROFESSOR PAFFENBARGER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in engineering drawing, and the permission of the instructor, in addition to any prerequisites stated in the description of the courses.

701. Chemical Machine Drawing. Two credit hours. Winter Quarter. Six laboratory hours each week. Mr. Paffenbarger.

The drawing and design of machinery and apparatus as related to industrial chemistry.

704. Chemical Plant Layout and Design. Four credit hours. Spring Quarter. Twelve laboratory hours each week. Prerequisite, Engineering Drawing 701. Mr. Paffenbarger.

Sketching and preliminary layout of industrial chemical plants. Design and drawing of a complete plant for the manufacture of a chemical or related product.

NOTE: TEACHING COURSES. For the Teaching Courses in this department see the Department of Principles of Education, Courses 750 and 751.

ENGLISH

Office, 121 Derby Hall

PROFESSORS BECK, DENNEY, TAYLOR, McKNIGHT, GRAVES, KETCHAM, ANDREWS, PERCIVAL, AND WILEY, ASSISTANT PROFESSORS WALLEY, HATCHER, FRIERSON, MILLER, AND WILSON, MISS DENTON, MR. EMSLEY, MR. NEWDICK, MR. ROSS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Unless otherwise noted the prerequisite to courses in this group is four Quarters in English courses.

608. American Literature. Five credit hours. Spring Quarter. Mr. Taylor.

An historical survey by lecture and prescribed reading in the chief writers. One minor research will be required of each student.

627. History of the English Language. Three credit hours. Winter Quarter. Lectures, quiz, and reports. Mr. McKnight.

A brief study of the English language prior to Chaucer, followed by a more detailed study of the later development of the language and the way it became standardized in grammar and vocabulary.

Especial attention is paid to the modern period, to the history of pronunciation and spelling, and the development of the rules which govern modern English usage.

Not open to students who have credit for English 427.

636. Eighteenth Century Poetry and Prose. Five credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. Percival.

A study of the classical, romantic, realistic and sentimental literature of the eighteenth century. Representative prose, poetry, and drama. Especial attention will be given to a study of the life and times of Dr. Samuel Johnson.

639. The Essay. Five credit hours. Winter Quarter. Lectures, critical study, quiz. Mr. Beck.

The origin and development of the English essay as a literary type.

641. Nineteenth Century Poetry: Romantic. Five credit hours. One Quarter. Autumn, Winter, Spring. Lectures, quiz, readings. Mr. Taylor, Mr. Percival.

Wordsworth, Shelley, Keats, and their contemporaries.

Not open to students who have credit for English 441.

644. Nineteenth Century Prose. Five credit hours. One Quarter. Autumn and Spring. Lectures, readings, discussions. Mr. Newdick, Mr. Beck.

Reading in Hunt, Hazlitt, Lamb, DeQuincey, Landor, Macaulay, Carlyle, Newman, Ruskin, Arnold, Huxley, Pater, Stevenson, and in recent and contemporary essayists.

Not open to students who have credit for English 446.

646. Middle English. Three credit hours. Spring Quarter. Prerequisite, English 651. Mr. Emsley.

Grammar and reading of selected texts.

651. Old English. Three credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. McKnight.

Grammar and reading of selected texts.

652. Old English Poetry. Three credit hours. Winter Quarter. Prerequisite, English 651. Mr. McKnight.

Beowulf and other assigned texts.

653. Chaucer and His Principal Contemporaries and Successors. Five credit hours. Winter Quarter. Lectures, quiz, readings. Class enrollment limited to thirty. Mr. McKnight.

Chaucer's principal works are read. Consideration is also given to Gower, Wycliffe, Langland, the author of Sir Gawayne and the Grene Knight, Occleve, Lydgate, Barbour, James I of Scotland, Dunbar, etc.

654. English Medieval Literature to Chaucer. Five credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. McKnight.

A study of epic poetry in early English, followed by a study of legends, romances, tales, and metrical histories, all done by means of modern English renderings.

655. The Novel: Richardson to Scott. Five credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. Taylor.

The history and development of the novel in this period is given by lecture. Reading and criticism of Richardson, Fielding, Sterne, Jane Austen, and Scott.

656. The Novel: Dickens to Meredith. Five credit hours. Winter Quarter. Lectures, quiz, readings. Mr. Taylor.

The history and development of the novel in this period is given by lecture. Reading and criticism of Dickens, Thackeray, Trollope, George Eliot, Meredith, Hardy, James, and Conrad.

657. Versification. Five credit hours. Spring Quarter. Lectures, reading, practice. Special permission necessary. Class enrollment limited to thirty. Mr. Graves.

The theory of verse structure with a history of the principal English rhythms, and practice in verse composition.

658. The Short Story. Five credit hours. Winter Quarter. Lectures, quiz, readings. Special permission necessary. Class enrollment limited to thirty. Mr. Graves.

Lectures on structure and form in the short story, with class reports on assigned readings, and practice in story writing.

659. Seventeenth Century Literature. Five credit hours. One Quarter. Autumn and Spring. Four meetings each week and a fifth meeting at the option of the instructor. Mr. Andrews, Mr. Walley.

Non-dramatic literature of the seventeenth century with special reference to Milton. The poetry of Milton, Jonson, Donne, Herrick, the Cavaliers, and the church poets. The prose of Walton and the character books; Bacon, Burton, Browne, and Bunyan.

664. The Celtic Renaissance. Five credit hours. Spring Quarter. Four meetings each week and a fifth meeting at the option of the instructor. Class enrollment limited to twenty. Mr. McKnight.

Subjects for study: The Ossianic literature of the eighteenth century, Lady Guest's translation of the Welsh Mabinogion and the English literary works inspired by the translation. The modern revival of ancient Irish story and the related modern literature by Yeats, A. E., George Moore, Lady Gregory, Fiona Macleod, Synge, and others.

Not open to students who have credit for English 813.

670. Recent and Contemporary Drama. Five credit hours. Spring Quarter. Four meetings each week with special reading in lieu of the fifth meeting. Prerequisite, a course in Shakespeare. Mr. Andrews.

Fifty plays of the following authors will be read: Ibsen, Strindberg, Hauptmann, Wedekind, Kaiser, Chekov, Gorky, Capek, Molnar, Brieux, Claudel, Rostand, Maeterlinck, Wilde, Pinero, Galsworthy, Mayne, Ervine, Shaw, O'Neill and others.

674. Spenser. Five credit hours. Winter Quarter. Lectures, readings, reports. Mr. Hatcher.

A study of non-dramatic Elizabethan literature. Spenser, the development of the Elizabethan lyric, the sonnet sequences, the translations, the prose of Lyly, Sidney, Lodge, Green, and Nash.

675. Play Production. Five credit hours. Winter Quarter. Open to Seniors by special permission. Director, Mr. Miller.

Lectures and readings on the organization of little theater groups and the staging of plays.

676. Shakespeare and Contemporary Dramatists. Five credit hours. Autumn Quarter. Prerequisite, an elementary course in Shakespeare. Mr. Denney.

Not open to students who have credit for English 672.

677. Shakespeare and Contemporary Dramatists. Five credit hours. Winter Quarter. Prerequisite, English 676. Mr. Denney.

Not open to students who have credit for English 672.

680. The Influence of the Theater on the Drama. Three credit hours. Spring Quarter. Mr. Miller.

A study of the changes in dramatic form as a result of changes in the theater.

NOTE: TEACHING COURSES. For the Teaching Courses in this department see the Department of Principles of Education, Courses 662, 714 and 717.

FOR GRADUATES

General Information for Graduate Students:

(1) Graduate study in English presupposes an undergraduate major in English (i.e. not less than 40 Quarter hours) and a reading knowledge of either French or German. Students deficient in either of these respects, in order to qualify for admission to candidacy for the M.A. degree, must be prepared to make up the deficiency by taking such extra work as the department may deem necessary. This will often entail a longer period of residence.

(2) The graduate courses elected in preparation for the M.A. degree in English may be confined to courses offered by the English department. But this extreme concentration is not required. A student is not only permitted, but urged, to elect related courses (not exceeding one-third of his entire program) offered by other departments. Courses recognized as suitable for such election are the graduate courses in foreign languages, in history, and in philosophy and the following additional courses: Phonetics 601, 610; Psychology 607, 621, 626, 630, 631, 645; Principles and Practice of Education 640, 662, 714; Music 601, 602, 603, 605; History of Education 601; Fine Arts 654; Political Science 621, 622, 623. Other courses, to be acceptable, must have the approval of the Graduate Committee of the English Department.

(3) The faculty adviser of the student will examine the student's preparation in English and in allied subjects and plan with him a suitable program of graduate study, including reading which is not a specified part of any particular course. These and other essential facts will be entered on the department record cards for its graduate students.

(4) Graduate study in the English department may be centered in the field of literature, of language, or of speech.

For an M.A. degree in English literature a candidate must offer evidence of (a) a general knowledge of the development of the English language and of the major authors and movements in English and American literature, and (b) a more detailed knowledge of one of the principal periods.

For an M.A. degree in English language a candidate must offer evidence of (a) a general knowledge of phonetics and of language history, and (b) a detailed knowledge of the stages in the development of the English language. He must also be acquainted with the literary history which forms a background in the development of the language.

For the M.A. degree in English speech a candidate must have (a) a detailed knowledge of phonetics, of rhetorical theories in their successive development, and of the theories of persuasion, and (b) a general knowledge of the main trends and personalities in English literature. He must also offer evidence of training in clear oral expression.

(5) The test of qualification for admission to candidacy for the M.A. degree will be a written examination taken normally at the end of thirty Quarter hours of work. For students expecting to take the degree at the end of the Summer Quarter this examination may be given at the beginning of that Quarter.

(6) The thesis required for an advanced degree is intended to afford training in independent study and research. Since this training is a major purpose in the seminary (800) courses devoted to particular fields, the thesis will normally grow out of one of these courses. Additional credit, however, for work in preparation of the thesis may be gained by enrollment in one or more of the special dissertation courses, English 819, 820, 821.

An undergraduate student may not elect a course in the "800" group except by permission of the Graduate Council.

800. Bibliography and Methods of Research in English Literature. Two credit hours. Autumn Quarter. Mr. Newdick.

Chief sources of material. Methods of investigation. Illustrative minor problems correlated with other courses. Recommended to graduate students as preparation for the writing of dissertations.

801. History of the Short Narrative in English. Two credit hours. Autumn Quarter. One two-hour session each week. Mr. Graves.

An investigation of types of the short story in English, from the Middle Ages to the present.

802. The Lyric. Two credit hours. Winter Quarter. One two-hour session each week. Mr. Graves.

A study of the characteristics of lyrical poetry with a history of the lyric in English literature.

805. Studies in Criticism. Two credit hours. One Quarter. Autumn and Spring. One two-hour session each week. Mr. Denney.

Topic for 1932-1933: History of Critical Theory.

806. Problems in Comedy. Two credit hours. Winter Quarter. One two-hour session each week. Mr. Denney.

807. The Novel: End of the Nineteenth Century. Two credit hours. Winter Quarter. One two-hour session each week. Mr. Taylor.

A trial thesis in one artist of the field: Meredith, Hardy, James, Pater, Morris, Stevenson, Kipling, Conrad.

808. Poetry: End of the Nineteenth Century. Two credit hours. Autumn Quarter. One two-hour session each week. Mr. Taylor.

A trial thesis in the field from Rossetti and Swinburne to the poets of the Nineties. The field will at times be extended backward to include Tennyson and Browning, and by announcement or election may be concentrated upon one or two artists.

809. The Twentieth Century Realistic Novel: Considered in Relation to Its Origins, English and French. Two credit hours. Spring Quarter. One two-hour session each week. Mr. Frierson.

810. Studies in Modern English Language. Three credit hours. Winter Quarter. One two-hour session each week. Prerequisite, English 627 or its equivalent. Mr. McKnight.

811. Studies in the Period of Chaucer. Three credit hours. Spring Quarter. One two-hour session each week. Prerequisite, English 653. Mr. McKnight.

814. Studies in American Literature. Two credit hours. Spring Quarter. One two-hour session each week. Mr. Taylor.

Topic for 1933: The American Novel to 1890.

815. Studies in Seventeenth Century Literature. Five credit hours. One Quarter. Autumn, Winter, Spring. One two-hour session each week. Prerequisite or concurrent, English 659 and 676-677.

Topic for 1932-1933: Milton, Mr. Andrews; Jacobean Drama, Mr. Walley; Restoration Drama, Mr. Wilson.

816. Studies in Poetic Rhythm. Two credit hours. Autumn Quarter. One two-hour session each week. Mr. Hatcher.

818. Studies in Eighteenth Century Literature. Five credit hours. Spring Quarter. One two-hour session each week. Prerequisite, English 636. Mr. Percival.

819-820-821. Discussion of Dissertations. Two to five credit hours. Autumn, Winter, and Spring Quarters. Individual investigations. Mr. Denney, Mr. Taylor, Mr. Graves. Mr. McKnight, Mr. Andrews, Mr. Percival, Mr. Walley, Mr. Wilson.

822. Play Writing. Two credit hours. Spring Quarter. One two-hour session each week. Class enrollment limited to twelve. Special permission necessary. Application must be made at least six weeks before the opening of the Quarter. Director, Mr. Miller.

Special attention to the one-act play.

823. Studies in the Romantic Movement. Five credit hours. Autumn Quarter. One two-hour session each week. Except by special permission students who elect this course will be expected to continue it with English 824 the following Quarter. Mr. Percival.

Not open to students who have credit for English 817.

824. Studies in the Romantic Movement (Continued). Five credit hours. Winter Quarter. One two-hour session each week and conferences. Prerequisite, English 823. In this course students will be expected to work out some problem which has arisen in the preceding course, English 823. Mr. Percival.

PUBLIC SPEAKING

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in English and public speaking.

610. Advanced Debate Practice. Five credit hours. One Quarter. Autumn and Winter. Two practice periods and special meetings each week. Special permission necessary. Miss Denton, Mr. Glander.

An advanced course for students who show special ability in debate.

Not open to students who have credit for Public Speaking 410.

614. Extempore Speaking. Five credit hours. Winter Quarter. Prerequisite, ten hours in public speaking. Mr. Wiley.

Practice in gathering and arranging speech material for extemporaneous addresses. Special exercises for developing clearness, concreteness, connotation, unity, and movement in extemporaneous speaking.

Not open to students who have credit for Public Speaking 414.

621. Masters of Public Address. Five credit hours. Winter Quarter. Lectures, readings, oral reports. Mr. Ross.

Consideration will be given to the life of the speaker, the events leading up to his principal public addresses, his subject matter and its treatment, and his influence. The studies will include Demosthenes, Cicero, Burke, Erskine, Gladstone, Henry, Webster, Clay, Calhoun, Lincoln, Beecher, Phillips, Bryan, Wilson, and Lloyd George.

Not open to students who have credit for Public Speaking 421.

625. The Forms of Public Address. Five credit hours. Spring Quarter. Mr. Ketcham.

A study of the methods of the foremost American and English orators. Class discussions. Practice in the use of different forms of public address. Formal orations; inaugurals; nominating speeches; after-dinner speaking; discussions of current events; political, business, and social addresses.

Not open to students who have credit for Public Speaking 525.

651. Special Problems in the Theory of Public Speaking. Five credit hours. Spring Quarter. Mr. Ketcham.

The function of the public speaker in reforms, revolutions, and public movements. Criticism and appreciation. Ideals, aesthetic standards in public speaking. Each student is required to make investigations in some special problem and to bring his results before the class for discussion.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 760.

ENTOMOLOGY

(See Zoology and Entomology)

EUROPEAN HISTORY

(See History)

FARM CROPS

Office, 101 Horticulture Building

PROFESSORS PARK AND WILLARD, ASSISTANT PROFESSOR BORST

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in botany and farm crops. Course 602 requires also an elementary course in heredity (Zoology 403) and does not require a course in Farm Crops.

602. Plant Breeding. Five credit hours. Spring Quarter. Four lectures and one two-hour laboratory period each week. Mr. Park.

Application of the principles of genetics to the breeding of our important agricultural plants. Laboratory study of cereal hybrid populations, practice in crossing plants, and study of the technique involved in plant breeding work.

603. Crop Experimentation. Three credit hours. Spring Quarter. Two lecture periods and the equivalent of two laboratory hours each week. Mr. Borst, Mr. Willard.

This course is a brief study of the methods of crop experimentation in the field, the sources of error involved and the interpretation of results. It is intended for those preparing for research or teaching in farm crops or related lines. A trip will be made to Wooster.

701. Special Problems. Three to fifteen credit hours. May be taken in units of three to five credit hours for one, two, or three Quarters. Autumn, Winter, Spring. Prerequisite, the consent of the instructor. Mr. Park, Mr. Willard, Mr. Borst.

The department is prepared to give instruction in many subjects for which there is too small a demand to warrant offering separate courses. Students desiring further training in any phase of crop production may register under this number. Problems in the culture, utilization, classification, grading and breeding of farm crops may be studied in the field, laboratory or library. Special crops that are not included in the other courses, such as tobacco, sugar beets, hemp and flax, may be studied.

FOR GRADUATES

Prerequisite for Graduate Work: As a prerequisite for graduate work in farm crops students must have had at least one year's work in college botany, one year's work in college chemistry, an introductory course in soils, and one year's work in farm crops.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Plant Breeding and Crop Production. Five to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Park, Mr. Willard, Mr. Borst.

802. Seminary. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in farm crops.

FINE ARTS

Office, 201 Hayes Hall

PROFESSORS HOPKINS, FANNING, PAYANT, LYNCH, AND BAGGS, ASSOCIATE PROFESSOR ROBINSON, ASSISTANT PROFESSORS FREY, WISER, AND RANNELLS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

To be admitted to graduate work in the Department of Fine Arts, students should have had fundamental courses in drawing, painting or sculpture, design and history of the fine arts, such as have been required of students majoring in the fine arts in any recognized university within the last five years.

Students whose general education, maturity and experience justify it, may be admitted to the courses without becoming candidates for the degree and pursue subjects for which they are qualified.

Requirements for the degree of Master of Arts. For properly qualified students the curricula below lead to the degree of Master of Arts. To receive this degree students must pass an examination upon the subjects taken and complete a satisfactory thesis as required of all candidates for the Master's degree. In Fine Arts this may be written, in case of the historical curriculum, or, in the technical curriculum, may consist of painting, sculpture or of design. In any case a written statement of the problems and solution, with as many illustrations as may conveniently be compiled for presentation, is required.

Curriculum in Fine Arts

(Technical)

Fine Arts	(661) 5	Fine Arts	(662) 5	Fine Arts	(663) 5
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5
Fine Arts	(670) 2	Fine Arts	(672) 2	Fine Arts	(676) 2
Fine Arts	(671) 3	Fine Arts	(673) 3	Fine Arts	(677) 3

Curriculum in Fine Arts

(Historical)

Fine Arts	(670) 2	Fine Arts	(672) 2	Fine Arts	(676) 2
Fine Arts	(671) 3	Fine Arts	(673) 3	Fine Arts	(677) 3
Thesis	5	Thesis	5	Thesis	5
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5

Combination Curricula

In cases where Fine Arts is combined with other subjects the student should consult the department in regard to the proper sequence of courses.

654. History of Renaissance Art. Five credit hours. Spring Quarter. Five lectures each week. Mr. Fanning.

The study of the Renaissance movement in Italy as reflected in architecture, painting, and sculpture; its influence upon other countries and its relationship to the intellectual trend from the fifteenth to the nineteenth century.

***656. History of Oriental Art.** Five credit hours. Winter Quarter. Five lectures each week. Mr. Fanning.

The study of Asiatic culture expressed by the historical development of architecture, sculpture, and painting in Persia, India, China, and Japan. Illustrated lectures, reading, and reports.

661-662-663. Advanced Technical Problems. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Hopkins, Mr. Fanning, Mr. Payant, Mr. Frey, Mr. Lynch, Mr. Wiser, Mr. Rannells.

This course is open, by permission of the department, to students who have shown particular ability in design, drawing, painting, or sculpture and who wish to pursue advanced problems in these fields under the supervision of the department. Students in Landscape Architecture pursue special work in design and construction under these courses.

670. History of the Art of Ancient Egypt and Mesopotamia. Two credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of the ancient arts of the valleys of the Nile and Tigris-Euphrates and their influence upon eastern Mediteranean culture. Lectures, discussions and presentation by each student of some special problem of research.

671. History of Hellenic Art. Three credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of Greek architecture, sculpture, and painting. Lectures, round table discussions and presentation by each student of some special problems of research.

672. History of Moslem Art. Two credit hours. Winter Quarter. Alternating with Fine Arts 674. Mr. Fanning.

The study of Moslem architecture and minor arts with special attention to origins and influences. Lectures, reading, and reports.

673. History of Christian Art of the Middle Ages. Three credit hours. Winter Quarter. Mr. Fanning.

The specialized study of various phases of Romanesque and Gothic art as an expres-

* Not given in 1932-1933.

sion of medieval Christianity in Italy, France, Germany, Spain, and England. Lectures, reading, discussion and reports on research topics.

*674. **History of Spanish Art.** Two credit hours. Winter Quarter. Alternating with Fine Arts 672. Mr. Fanning.

The study of the architecture, sculpture, painting, and minor arts of Spain and the countries under Spanish influence. Lectures and reports.

676. **History of American Art.** Two credit hours. Spring Quarter. Alternating with Fine Arts 678. Mr. Fanning, Miss Robinson.

A study of the work of the outstanding architects, painters, and sculptors in America as an index of the artistic trend of the eighteenth, nineteenth, and twentieth centuries. Illustrated lectures, reading, and reports.

677. **History of French Art from the Beginning of the Seventeenth Century to the Present Day.** Three credit hours. Spring Quarter. Alternating with Fine Arts 679. Reading knowledge of French required. Mr. Fanning, Miss Robinson.

A specialized study of the architecture, sculpture, and painting of modern France. Illustrated lectures, reading, and reports.

*678. **History of Art in the Low Countries.** Two credit hours. Spring Quarter. Alternating with Fine Arts 676. Reading knowledge of German or Dutch is desirable. Mr. Fanning.

Concentration upon the paintings of the Flemish and Dutch painters of the sixteenth and seventeenth centuries. Lectures and reports.

*679. **History of German Art.** Three credit hours. Spring Quarter. Alternating with Fine Arts 677. Reading knowledge of German required. Mr. Fanning.

A specialized study of the architecture, sculpture, and painting of the Germanic people and their relationships to social and political development. Lectures, reading, and reports.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. **Major Problems in Technical Research.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Hopkins, Mr. Fanning, Mr. Frey, Mr. Payant, Mr. Wiser.

This course is open, by permission of the department, to graduate students who are qualified to do original work in ceramics, painting, or sculpture.

804-805-806. **Major Problems in Historical Research.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Fanning, Mr. Baggs.

This course is open, by permission of the department, to graduate students who are qualified to do original research in the history of fine arts.

FRENCH

(See Romance Languages and Literatures)

* Not given in 1932-1933.

GEOGRAPHY

Office, 213 Commerce Building

PROFESSORS HUNTINGTON, VAN CLEEF, PEATTIE, AND CARLSON, ASSISTANT PROFESSOR SMITH, MR. VARVEL, MR. WRIGHT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in geography and economics in addition to any prerequisites stated in the description of the courses.

603. The Localization of Manufacturing Industries of the United States. Four credit hours. Spring Quarter. Four recitations each week. Mr. Wright.

Geographic influences on American manufacturing. The distribution of the industry of the United States. The relation of land and population to the growth and variety of manufactures. Factors affecting the localization of particular industries. The development of centers of general industry. Industrial districts. Classification and analysis of the manufacturing business of the United States as a whole, and special study of representative industries, as to labor supply, sources, quantity, and value of material and power used, transportation facilities available, quantity and value of products, and problems of competition and markets. A term report will be required of each student.

604. Conservation of Natural Resources. Two credit hours. Autumn Quarter. Two recitations each week. Mr. Huntington.

The importance of the fundamental natural resources: agricultural, forest, mineral, and water. The exploitation of soils, forests, mines, etc., and the movement for their conservation. The reclamation of arid and swamp land, reduction of erosion, development of forestry, elimination of waste in mining, and problems in the utilization of inland water resources.

605. Economic and Social Geography of Ohio. Two credit hours. Winter Quarter. Two recitations each week. Mr. Huntington.

Geographic influences in the history of the state. A study of its agriculture, industries, and social conditions, together with the underlying physical, climatic, and other environmental factors that have contributed to the present development of the region.

606. Land Utilization. Two credit hours. Spring Quarter. Mr. Huntington.

Land as a natural resource. Its importance and classification. A discussion of agricultural, forest, mineral, and urban lands. Character and location as factors in utilization and value. The relation of classification to land policies and conservation policies. City planning, zoning, and suburban development.

621. Geography of Europe. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Van Cleef.

A consideration of the major geographic problems of the continent. A study of the economic, social, and political progress of the nations as affected by their geographic conditions.

623. Geography of South America. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Carlson.

A study of South America by countries. Location, topography, climate, and natural resources, influencing economic, social, and political development. The commercial relations of South America, with particular reference to the United States.

624. Geography of the Caribbean Region. Three credit hours. Winter Quarter. Three recitations each week. Mr. Carlson.

The geography of the regions between the United States and South America. Their resources, industries, and products. The economic and social development of their people and the nature and relations of their trade, particularly with the United States.

625. Geography of the Far East. Three credit hours. Spring Quarter. Three recitations each week. Mr. Varvel.

The geographical aspects of the economic and political problems of Eastern and Southern Asia, of the East Indies, and of the island groups of the Pacific Ocean. A study of the ratio of the natural resources to population and the resultant economic, social, and political consequences. The commercial relations of the United States with Asia and Australasia. Readings and reports.

631. The Geography and History of Commerce. Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Prerequisite, elementary courses in geography or four Quarters in history. Mr. Peattie.

A study of the basis and development of commerce from earliest times to the present. The successive leadership among the nations and the contributing factors. Geographic influences in present-day national commercial policies and in modern business.

632. World Industries and Commerce. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Wright.

A survey of the world's important agricultural and manufacturing industries and the geographic factors influencing their location and development. Mineral resources and industries. The exchange of commodities; the direction of movement; and the balance of trade. The relation of trade balances to industrial development. Essential raw materials in national and international affairs. The possible world markets for the American merchant.

634. Trade Centers and Trade Routes. Three credit hours. One Quarter. Winter and Spring. Three recitations each week. Mr. Van Cleef.

The world's principal ports, inland trade centers, and trade routes are considered in the light of both domestic and foreign trade development. A study of geographic factors in the establishment and growth of trade centers. The reciprocal relations in the development of the hinterland and trade centers.

The world's great trade routes, including land as well as water routes and their effect upon the shifting of trade centers. The significance of inland waterways in trade. The influence of the automobile, airplane, and airship upon routes. The work of a port. Planning for its future.

The part played by postal, telegraph, cable, wireless, and radio communication in the world's trade. Coaling stations, their location, strategic and economic importance.

641. Field Work in Geography and Commerce. One to three credit hours. One Quarter. Autumn and Spring. Prerequisite, eighteen hours of geography, and consent of the instructor. Graduate students should take "800" courses. Not more than six hours' credit may be derived from Geography 641 and 642. But three hours' credit from these courses will be given in a single Quarter. Mr. Huntington, Mr. Van Cleef, Mr. Peattie, Mr. Carlson, Mr. Smith.

Special investigations in the field of applied geography. Each student will be required to write up the results of his work in the form of maps, diagrams, and a final typewritten report.

642. Special Problems in Geography and Commerce. Three credit hours. One Quarter. Autumn, Winter, Spring. Assigned readings, conferences, and reports. Prerequisite, eighteen hours of geography and consent of the instructor. Graduate students should take "800" courses. Not more than six hours' credit may be derived from Geography 641 and

642. But three hours' credit from these courses will be given in a single Quarter.

(a) Problems in Physical Geography. Mr. Peattie, Mr. Carlson.

(b) Problems in Climatology. Mr. Smith, Mr. Peattie.

(c) Problems in Political and Historical Geography. Mr. Huntington, Mr. Peattie.

(d) Problems in Economic and Commercial Geography. Mr. Huntington, Mr. Van Cleef, Mr. Carlson.

651. Anthropogeography. Four credit hours. Winter Quarter. Three recitations and one conference each week. Mr. Peattie.

A course founded upon the classical "Influences of Geographic Environment" by Semple. The geographic factors in history. Classes of geographic factors. Society and the State in relation to land. Geographical location. Geographical area. The significance of types of environment.

661. Problems in Historical Geography. Three credit hours. Winter Quarter. Three meetings each week. Mr. Peattie.

Studies in the principles of historical geography. Geographic factors in cultural developments.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research in Geography and Commerce. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, at least two years' work in geography, one year's work in economics, and consent of the instructor. Mr. Huntington, Mr. Van Cleef, Mr. Peattie, Mr. Carlson, Mr. Smith.

Assigned problems for investigation and reports under the direction of the instructor.

805-806-807. Departmental Seminary in Geography and Commerce. No credit hours. Autumn, Winter, and Spring Quarters. All instructors.

808-809-810. Research in the Geography of Conservation and Land Utilization. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, two years of work in geography and the consent of the instructor. Mr. Huntington, Mr. Carlson.

Individual investigations, conferences, and reports.

811. History of Geography. Two credit hours. Spring Quarter. Two recitations or lectures each week. Prerequisite, eighteen hours of geography. Mr. Van Cleef, Mr. Peattie.

Readings in the classics. The history of the development of geographic theories. Modern tendencies as seen in current literature. This course is primarily intended for students majoring in geography or taking the higher degrees.

815-816-817. Problems in the Geography of Foreign Commerce. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, two years of work in geography and the consent of the instructor. Mr. Van Cleef.

Conferences, readings, research.

821-822-823. Problems in Industrial and Agricultural Geography. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, two years of work in geography and the consent of the instructor. Mr. Carlson.

Individual research, conferences, and reports.

831-832-833. Research in Physical Geography. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, two years of work in geography and the consent of the instructor. Mr. Peattie, Mr. Smith.

Conferences, assigned problems, and reports.

841. Seminary in Geography. Five credit hours. Autumn Quarter. One meeting and one conference each week. Open to graduate students specializing in geography. Mr. Peattie.

Some problem of research will be selected to which the group as a whole will contribute.

843. Seminary in Geography. Five credit hours. Spring Quarter. Prerequisite, the permission of the instructor. Mr. Carlson.

This course presents an opportunity for advanced research in the geography of Latin America.

GEOLOGY†

Offices, 103, 104 Orton Hall

PROFESSOR CARMAN, ASSOCIATE PROFESSOR SPIEKER, ASSISTANT PROFESSORS GRAHAM, STEWART AND STOCKDALE, MR. STOUT, MR. COLE, MR. BERRY, MR. HOLMBERG

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in geology in addition to any prerequisites stated in the description of the courses.

601. Advanced Paleontology. Three or four credit hours. Autumn Quarter. Laboratory work. Prerequisite, introductory paleontology. Miss Stewart, Mr. Carman.

The identification of faunas of various geological formations, particularly those of Ohio.

602. Advanced Paleontology. Three or four credit hours. Winter Quarter. Miss Stewart, Mr. Carman.

A continuation of Geology 601.

603. Advanced Paleontology. Three or four credit hours. Spring Quarter. Miss Stewart, Mr. Carman.

A continuation of Geology 602.

605. Economic Geology: Metals. Five credit hours. Autumn Quarter. Five recitations or lectures each week. Prerequisite, four Quarters of geology or of geology and mineralogy and two Quarters of mineralogy. Mr. Graham.

A study of the nature of ores, their classification and origin; the metallic deposits.

606. Economic Geology: Non-Metals. Five credit hours. Winter Quarter. Five recitations or lectures each week. Prerequisite, four Quarters of geology or of geology and mineralogy and two Quarters of mineralogy. Mr. Graham.

A study of the non-metallic deposits including coal, with special emphasis on the coals of Ohio.

† For courses in mineralogy and petrography see the Department of Mineralogy.

607. Economic Geology: Petroleum. Five credit hours. Spring Quarter. Five recitations or lectures each week. Prerequisite, four Quarters of geology or geology and mineralogy. Mr. Graham.

A study of petroleum, natural gas, and the solid bitumens; their origin, geological relations, and distribution.

***608. Stratigraphic Geology of Ohio.** Five credit hours. Autumn Quarter. Prerequisite, four Quarters of geology or geology and mineralogy and consent of the instructor. Mr. Carman.

Field trips with reports, lectures, and assigned readings. Field trips on Saturdays (entire day) while the weather permits.

The geological formations of Ohio are studied in the field, by rock specimens, and by assigned readings. This course is intended to acquaint the student with the rock formations of Ohio.

***609. Petrology.** Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. Prerequisite, four Quarters of geology or of geology and mineralogy and two Quarters of mineralogy. Mr. Graham, Mr. Holmberg.

A study of the origin, mode of formation, and geologic relations of rocks, with laboratory study in rock identification.

610. Physiography of the United States. Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. Prerequisite, four Quarters of geology, or of geology and geography, including a fundamental course in physiography. Mr. Cole.

A study of the physiographic regions of the United States. The topographic form and physiographic history with the geologic history as a background. Designed to give the student of geology or geography a working knowledge of the physiography of the United States.

612. Special Problems. Three to five credit hours. All Quarters. Assigned readings, conferences, and reports. Prerequisite, four Quarters in geology and the consent of the chairman of the department.

A study of special topics by conferences and reports. Laboratory, library or field work.

615. Geological Surveying. Five credit hours. Spring Quarter. Two recitations and three field or laboratory periods each week. Prerequisite, four Quarters in geology. Students intending to elect this course should consult the instructor. Class limited to eight. Mr. Stockdale.

A study of the construction and interpretation of topographic and geologic maps, with special emphasis on instrument and map work in connection with oil surveying. Field practice in various methods of triangulation, traversing, and topographic sketching. Instruments used include plane table, telescopic alidade, open sight alidade, aneroid barometer, hand level, stadia, and compass.

616. Clays. Five credit hours. Winter Quarter. Recitations, lectures, and assigned readings. Prerequisite, four Quarters of geology and general chemistry. Mr. Stout.

The properties, distribution, uses, and origin of clays. Emphasis will be given to the clays of Ohio.

620. Introductory Paleontology. Three credit hours. Autumn Quarter. Two recitations and one two-hour laboratory period each

* Not given in 1932-1933.

week. Prerequisite, four Quarters of geology or of geology and zoology. Mr. Carman, Miss Stewart.

A study of the systematic classification of the animal kingdom as a means of becoming acquainted with the faunas that characterize the various geological formations. The course deals mainly with the generic characters of the fossil invertebrates and their use in identifying and correlating geological formations.

621. Introductory Paleontology. Three credit hours. Winter Quarter. Mr. Carman, Miss Stewart.

A continuation of Geology 620.

622. Introductory Paleontology. Three credit hours. Spring Quarter. Mr. Carman, Miss Stewart.

A continuation of Geology 621 but this course deals largely with the fossil vertebrates.

623. Micro-Paleontology. Three credit hours. Spring Quarter. Laboratory work. Prerequisite, Geology 620-621-622. Mr. Berry, Miss Stewart.

A study of fossil micro-organisms, especially the foraminifera.

*625. Field Trip to the Appalachian Mountains: Structural. Two credit hours. Between Winter and Spring Quarters. Prerequisite, permission of the instructor. Mr. Spieker.

A period of preparation and a satisfactory written report are required.

Study in the field of the stratigraphic section and typical structures of the Appalachian Mountains of Pennsylvania; a cross-section of the mountains, beginning at Gallitzin, Pa., and ending at South Mountain.

626. Field Trip to the Appalachian Mountains: Physiographic. Two credit hours. Between Winter and Spring Quarters. Prerequisite, permission of the instructor. Mr. Cole.

A study of the physiographic form and history of the Appalachian region, including the Allegheny Plateau, the Great Valley, and the older Appalachians, of West Virginia, Virginia, and Maryland. A period of preparation and a satisfactory written report are required.

†627. Field Geology. Eight credit hours. Prerequisite, permission of the instructor. Limited to men. Mr. Stockdale.

This course offers training in the standard methods of geologic field work. It is conducted from a fixed field camp at Cumberland Spring, near Dayton, Tennessee, and employs the entire time of the students. The field for study is the Appalachian region of eastern Tennessee, which offers considerable variety in physiographic, stratigraphic, structural and economic geology. The course begins about June 15 and continues five weeks, after which a report will be prepared by each student and submitted by the following December first.

630. Paleobotany. Four credit hours. Winter Quarter. Lectures, assigned readings and laboratory. Prerequisite, consent of the instructor. Mr. Berry.

A study of the fossil plants, their development and spread. Treated principally from the view of geologic succession and the use of fossil plants in identifying and correlating geological formations.

632. Microscopic Study of the Opaque Ore Minerals. Three credit hours. Spring Quarter. Prerequisite, Geology 605. Mr. Graham.

Training in the methods of identification of the opaque minerals found in ore de-

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

posits, significance of textural and structural relationships, and the paragenesis of the ore minerals.

FOR GRADUATES

Prerequisite for Graduate Work: The courses named below presuppose two years' work of collegiate character in geology, which will usually consist of the general courses in physiography and inorganic and historical geology. If the student intends to specialize in historical geology he should have had, in addition to the above, courses in chemistry, and zoology; if in inorganic geology, courses in chemistry, physics, and mineralogy; if in physiography, courses in physics and chemistry.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Advanced Historical Geology. Three credit hours. Autumn Quarter. Lectures and laboratory. Prerequisite, six courses in geology. Mr. Carman.

A study of the physical history of the North American continent and of the life development which has taken place upon it. The lithology, subdivisions, geographical distribution, and fossils of each system are studied and from these the geological history of the time is interpreted.

802. Advanced Historical Geology. Three credit hours. Winter Quarter. Mr. Carman.

A continuation of Geology 801.

803. Advanced Historical Geology. Three credit hours. Spring Quarter. Mr. Carman, Mr. Spieker.

A continuation of Geology 802.

804. Research. Three to five credit hours. Autumn, Winter, and Spring Quarters. Field, laboratory and library study. Prerequisite, acceptable courses in the field chosen and consent of instructor.

Research in stratigraphy is conducted under the supervision of Mr. Carman, Mr. Spieker, and Mr. Stockdale; in paleontology under Mr. Carman, Miss Stewart, and Mr. Berry; in sedimentation under Mr. Spieker; in economic geology and petrology under Mr. Graham; and in physiography under Mr. Cole.

***810. Geology of the Eastern United States.** Three credit hours. Winter Quarter. Lectures, readings, conferences. Prerequisite, acceptable courses in historical and structural geology. Mr. Carman.

A review of the important stratigraphic and structural features of the Eastern United States. Special attention is given to the correlation of the important formations, the major structures and the geological history of the regions studied.

***811. Geology of the Western United States.** Three credit hours. Spring Quarter. Lectures, readings, conferences. Prerequisite, acceptable courses in historical and structural geology. Mr. Spieker.

A review of the important stratigraphic and structural features of the Western United States, as exemplified by the Cordilleran region. Special attention is given to the correlation of the important formations, the major structures, and the paleogeography of the region.

812. Principles of Sedimentation and Stratigraphy. Five credit hours. Spring Quarter. Prerequisite, courses in advanced general geology. Four lectures and one conference each week. Mr. Spieker.

The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy, in which attention is given chiefly to processes of

* Not given in 1932-1933.

sedimentation and their results, the interpretative study of sedimentary rocks, and the general problems of correlation.

Not open to students who have credit for Geology 618.

815. Seminary in Metamorphic Geology. Two credit hours. Autumn Quarter. Prerequisite, Geology 609. Mr. Graham.

A study of the processes of metamorphism, with a critical analysis of the rock types produced.

816. Seminary in Structural Geology. Two credit hours. Winter Quarter. Mr. Spieker.

Conferences for the discussion of problems in geologic structure as exemplified and developed in selected mountain regions.

817. Seminary in Earth Tectonics. Two credit hours. Spring Quarter. Mr. Spieker.

Conferences covering the broader and more fundamental problems of earth structure, involving chiefly the nature and origin of crustal forces.

GERMAN

Offices, 210, 211, 212, 213, 318, 319 Derby Hall

PROFESSORS EVANS, EISENLOHR, KURATH, AND MAHR, ASSISTANT PROFESSORS THOMAS (EMERITUS) AND ROESELER, MR. NORDSIECK

501. Elementary Course in the Reading of German. No credit. One Quarter. Autumn, Winter, Spring. Five recitations each week. Open only to Seniors and graduate students. This course is not accepted as a prerequisite for any course in the department except German 502. Mr. Röseler, Mr. Nordsieck.

The course is designed for Seniors and graduate students who desire to acquire a reading knowledge of German. Essentials of grammar and easy readings.

This course will be withdrawn unless there is a registration of at least ten students.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for Courses in This Group: For students specializing in the department, six Quarters of German or equivalent; German 685 requires courses in German composition and the permission of the instructor in charge; German 695 requires the permission of the instructor.

Proseminary: Eighteenth and Nineteenth Century Literature. Three credit hours. Autumn, Winter, and Spring Quarters. Three hours lecture and quiz each week.

651-652-653. Survey of German Literature. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Evans, Mr. Mahr.

651. Autumn Quarter, 1932. German Literature from its beginnings to Lessing. Mr. Evans.

652. Winter Quarter, 1933. German literature of the "Storm and Stress" and of the classical period. Mr. Evans.

653. Spring Quarter, 1933. German literature from Romanticism to the present. Mr. Mahr.

655. German Phonetics. Three credit hours. Autumn Quarter. Three hours lecture and drill each week. Prerequisite, six Quarters of German or equivalent. Mr. Kurath.

A study of the standard of German pronunciation and its chief variations. Practice in reading and writing phonetic texts.

673. **Middle High German.** Three credit hours. Winter Quarter. Mr. Kurath.

Introduction to the morphology and syntax of Middle High German. Reading of selections from the Nibelungenlied and Walther von der Vogelweide.

675. **The German Language.** Three credit hours. Spring Quarter. Three hours lecture and quiz each week. Mr. Kurath.

The study of texts illustrating the history of the German language.

685. **Advanced Composition.** Three credit hours. Spring Quarter. Three hours lecture and quiz each week. Mr. Eisenlohr.

An advanced course in speaking and writing German, accompanied by a review of German syntax.

695. **Minor Investigations.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Investigations of minor problems in the various fields of German literature and philology.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 725.

FOR GRADUATES

Prerequisite for Graduate Work: At least eight Quarters of work of college grade or the equivalent.

Candidates for the Master's degree should consult with the department before arranging their course.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

*801. **Advanced Middle High German.** Three credit hours.

*805. **Gothic.** Three credit hours. Winter Quarter. Mr. Kurath.

810. **Old High German.** Three credit hours. Spring Quarter. Mr. Kurath.

859-860-861. **Seminary in German Literature.** Three credit hours. Autumn, Winter, and Spring Quarters.

859. Autumn Quarter, 1932. German Lyrics. Mr. Mahr.

860. Winter Quarter, 1933. Lessing's Controversial Works. Mr. Eisenlohr.

861. Spring Quarter, 1933. Schiller's Correspondence. Mr. Evans.

GREEK LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

HISTORY

Offices, 207, 204, 211, 215, 216, 217, 218, 305 University Hall

PROFESSORS WITTKE, SIEBERT (RESEARCH), McNEAL, HOCKETT, WASHBURNE AND DORN, ASSOCIATE PROFESSORS HILL AND McDONALD, ASSISTANT PROFESSORS NOYES AND ROSEBOOM, MR. SIMMS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

For *all* courses in this group, the prerequisite is at least four Quarters in the social science field, of which at least two must be in history. Specific prerequisites are

* Not given in 1932-1933.

indicated in connection with specific courses. These courses are not open to Freshmen or Sophomores.

607. The Renaissance. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Dorn.

The Renaissance primarily as an Italian movement. The political evolution of the Italian communes into city republics, with special emphasis on Florence, Milan, Venice, Genoa, and Rome; early capitalism and industrial and commercial movements; an analysis of the culture, art, science, and literature of the Renaissance and their influence upon the Church, the Papacy, and modern modes of thought and behavior. Lectures, readings, reports, and discussions.

608. The Reformation. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Dorn.

The Church and European society in the later Middle Ages; culture and thought in the age of the Reformation; the rise of the European state system; Luther and the German National movement; Zwingli and Switzerland; Calvin; the expansion of Protestantism in Europe; and the relation of the Reformation to medieval and modern civilization. Lectures, readings, reports, and discussions.

609. The Roman Empire, the Period of the Principate. Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite for undergraduates, History 656. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

The development of the Roman government during the transition from the Republic to the Empire and the history and institutions of the Empire from Augustus to the period of confusion in the third century. Lectures, readings, reports, and discussions.

610. The Late Roman Empire. Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, same as for History 609. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

A study of the history and institutions of the Empire from Diocletian to Justinian. Lectures, readings, reports, and discussions. The natural continuation of History 609, but may be taken separately.

611. Constitutional History of England to 1485. Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, a major in History. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

The origin and development of English legal institutions and government. Textbook, lectures, collateral readings, and discussions.

612. Constitutional History of England since 1485. Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, same as for History 611. Mr. Noyes.

A continuation of History 611. Special emphasis will be given to the evolution of parliamentary government, constitutional liberties, the cabinet and party system, Catholic emancipation, electoral reform, the Irish question, and the rise of democracy. Textbook, lectures, collateral readings, and discussions.

†613. England in the Tudor Period. Three credit hours. Spring Quarter. Three class meetings each week. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

An intensive study of England in the period of transition, emphasizing social and

† Not given during the academic year 1932-1933.

political conditions, together with a brief survey of contemporary Europe. Some attention will be given to the source material of the period. Lectures, readings, reports, and discussions.

†614. **England in the Stuart Period.** Three credit hours. Spring Quarter. Three class meetings each week. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

An intensive study of England in the seventeenth century emphasizing social and political conditions, and England's relations with Europe and North America. Some attention will be given to the source material of the period. Lectures, readings, reports, and discussions.

619. **Medieval Civilization.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, a major in history. Students majoring in other departments admitted only with consent of the instructor. Mr. McNeal.

The formation of feudal society; culture of castle and court; the rise of towns and their social and economic life; the evolution of the Medieval Church and its educational and artistic contributions. Lectures, readings, problems, and class discussion.

621. **Expansion of Europe to 1588.** Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study of the early geographical ideas of the Europeans, their first contact with the outside world, the period of discovery, the creation of the Portuguese empire in the east and the Spanish monopoly in the west, to the collapse of the Iberian control of European expansion by the destruction of the Armada in 1588. Lectures, readings, and discussions.

622. **Expansion of Europe from 1588 to 1815.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, same as for History 621. Mr. Washburne.

A study of the rise of the chartered trade companies, the ascendency of the Dutch, the contest between the Dutch and the English for commercial supremacy and the long struggle between the English and the French for maritime supremacy, with its resultant effects upon India and North America through the settlement at the end of the Napoleonic era. Lectures, readings, and discussions.

†623. **Expansion of Europe from 1815 to the Present.** Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, same as for History 621. Mr. Washburne.

A study of the problems of expansion in the nineteenth and twentieth centuries; the development of India; the movement into the Southern Pacific; the partition of Africa and the various phases of modern imperialism after 1876, through the readjustment of territory under the mandate system after the World War. Lectures, readings, and discussions.

624. **The French Revolution and Napoleon.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. McNeal.

625. **The Third French Republic.** Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, same as for History 624. Mr. McNeal.

† Not given during the academic year, 1932-1933.

628. The Reconstruction of Europe (1919-1932). Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, History 630. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

The first phase of reconstruction after the war, from the decisions of the Paris Conference of 1919 to the entrance of Germany into the League of Nations in 1926; the various national and international problems involved in the attempted settlement of world conditions. Lectures, readings and discussions.

629. Modern Germany (1789-1918). Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, History 401-402; advanced students from other departments without these prerequisites must obtain the consent of the instructor. Mr. Dorn.

Introductory lectures on the basic problems and tendencies of German history; Germany and the French Revolution; German Enlightment and Romanticism and their relation to political thought; the Stein-Hardenberg reforms and the war of liberation; Prussia, Austria and the problem of German unity; the nationalist and democratic movements; the Bismarckian Empire; industrial development; William II and the World War; the German Revolution of 1918. Lectures, readings, reports, and discussions.

630. The Diplomacy of Europe (1878-1919). Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study with the use of the new material now available, of the diplomatic obligations of the European states from the Congress of Berlin of 1878 to the Paris Conference of 1919; the formation of alliances, the crisis which culminated in the war, and the attitude of European leaders. Lectures, readings, and discussions.

631. Constitutional History of the United States to 1837. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hockett.

The purpose of this course, together with History 632, is to exhibit the growth of our constitutional system in its genetic aspects, as the product of vital social forces. Lectures, discussions, and reports.

632. Constitutional History since 1837. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hockett.

A continuation of History 631.

633. The Slavery Controversy in the United States. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Simms.

The ante-bellum South and its destruction; the Civil War in the light of the forces which tended to hasten or obstruct the clash of arms. Lectures, readings, and discussions.

634. Reconstruction and the New South (1863-1925). Three credit hours. Winter Quarter. Three class meetings each week. Mr. Simms.

The aftermath of the slavery struggle as traced in the reconstruction of the Southern States and in the readjustment of society and of the states to the new status of the negro, and to the economic forces of the last half century. Lectures, readings, reports, and discussions.

635. American Diplomacy to the Close of the Civil War. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hill.

The foreign relations of the United States, beginning with the diplomacy which resulted in the establishment of independence and including such subjects as the struggle

for neutral rights and commercial recognition, the extension of territory on the continent, the origin of the Monroe Doctrine, and the international controversies of the Civil War. Lectures, discussions, and reports.

636. American Diplomacy since the Civil War. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hill.

Problems in the diplomacy of the United States resulting from the Civil War, the development of the Monroe Doctrine, the acquisition of dependencies, relations with Latin America and the Orient, arbitration, the Isthmian Canal, and neutral rights during the Great War in Europe. Lectures, discussions, and reports.

637. Recent History of the United States (1875-1930). Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Wittke.

An intensive study, by the topical method, of political, constitutional, industrial, and social problems during the last fifty years. Among the topics to be considered are the economic revolution; the rehabilitation of the South; the transformation of the West; agrarian unrest; third party movements; money and banking, and the tariff. Lectures, text-book, collateral readings, and discussions.

638. Recent History of the United States (1875-1930). Three credit hours. Winter Quarter. Three class meetings each week. Mr. Wittke.

This course is the natural continuation of History 637, but may be taken separately. Among the topics to be considered are the rise of capitalistic combinations; transportation problems; the labor movement; the woman's movement; immigration; the trend of political reform; the foreign contacts of the United States; and the problems of reconstruction after the World War. Lectures, textbook, collateral readings, and discussions.

639. The Influence of Immigrant Groups upon United States History. Five credit hours. Spring Quarter. Five class meetings each week. Mr. Wittke.

The share of different immigrant groups in the building of the nation, from the colonial period to the present; with special emphasis on the influence of immigration upon American political, economic, social, and cultural development. Lectures, readings, and discussions.

640. The Pioneer in American History to 1812. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hockett.

This course, together with History 641, follows the expansion of settlement westward from the Atlantic coast, picturing the life of the pioneers and the rise of new communities, and tracing their influence upon national development. Lectures, discussions and reports.

641. The Pioneer in American History since 1812. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hockett.

A continuation of History 640.

643. Political Parties in the United States. Five credit hours. Spring Quarter. Five class meetings each week. Mr. Roseboom.

The radical part of the Revolution; the origin and growth of national parties; the slavery issue in party politics; the effect of the Civil War upon parties; party development in recent American history, special attention being devoted to the influence of the new economic and social conditions in creating new parties and policies. Lectures, readings, discussions, and reports.

644. The Colonization of North America. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Roseboom.

A survey of the transplanting of European culture and institutions to North America. Colonizing methods of the leading colonial powers will be considered as well as the expansion of their colonies and the resulting international struggle for supremacy, with special emphasis upon English colonization and institutional development. Lectures, readings, reports, and discussions.

645. Colonial Latin America. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hill.

The European background; conquest and settlement; institutions and social conditions; development of the revolutionary spirit and the wars for independence. Lectures, readings, and discussions.

646. The Latin-American Republics. Five credit hours. Spring Quarter. Five class meetings each week. Mr. Hill.

The establishment of the republics; evolution of the larger powers, with minor attention to the smaller; relations of the republics with one another and with the outside world. Lectures, readings, and discussions.

647. History of Canada. Five credit hours. Spring Quarter. Five class meetings each week. Mr. Wittke.

An intensive study of Canadian history with special emphasis on the relations of Canada with the United States and with the mother country, and the comparison of Canadian institutions and problems with our own. Lectures, textbook, collateral readings, and discussions.

653. The Ancient History of the Near East. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. McDonald.

A survey of the history of Egypt, Sumer, Akkad, Babylon, and Assyria. Lectures, readings, and reports.

***654. The Age of the Crusades.** Three credit hours. Spring Quarter. Three class meetings each week. Students majoring in other departments admitted only with the permission of the instructor. Mr. McNeal.

Conditions in western Europe preceding the First Crusade, influence of the early crusading movement on the development of western Europe in the twelfth century, contemporary accounts of the Crusades. Readings, lectures, and reports on contemporary sources.

655. Greek History. Five credit hours. Winter Quarter. Five class meetings each week. Mr. McDonald.

An intensive study of Greece, with a brief introductory survey of the ancient civilization of the Near East. Lectures, readings, reports, and discussions.

Not open to students who have credit for History 412.

656. Roman History. Five credit hours. Autumn Quarter. Five class meetings each week. Mr. McDonald.

This course is the natural continuation of History 655. Lectures, readings, reports, and discussions.

Not open to students who have credit for History 413.

659. The Hellenistic Age. Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, History 655. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

A study of the history, literature, and thought of the Greek world after Alexander. Lectures, readings, discussions and reports.

665. History of Spain and Portugal. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hill.

Physiography of the Iberian peninsula and its influence on history; the Invasions, the evolution of Spanish institutions and society, with special emphasis on Arabic influence; the reconquest and rise of Modern Spain and Portugal. Lectures, readings, and discussions. Open to students majoring in Spanish with the consent of the instructor.

* Not given in 1932-1933.

671. The Counter Reformation. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Dorn.

The Catholic Renaissance in Latin Europe; the Council of Trent, the Society of Jesus and modern Catholicism; the culture and art of the period; French classicism, and the early enlightenment; political and economic life in the age of Philip II; the Dutch Wars of independence and the politics of the Dutch Republic; the wars of religion in France; the Thirty Years War in Germany, and Hapsburg-Bourbon rivalry. Lectures, readings, reports, and discussions.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 700.

FOR GRADUATES

Prerequisite for Graduate Work: Candidacy for an advanced degree presupposes good foundation courses of collegiate grade in European and American history, economics and political science.

For the requirements for the degree of Master of Arts in history, see page 34.

The general requirements printed on pages 39-42 are applied to candidates for the degree of Doctor of Philosophy in history as follows:

The department will recommend the student for admission to candidacy for the degree when he has satisfactorily passed the General Examination, which must therefore be taken before the middle of the third Quarter prior to the date at which he plans to receive the degree.

For the purposes of the General Examination the subject of history is divided as follows:

DIVISION I

(1) Greek History.
(2) Roman History.
(3) Political and Institutional History of the Middle Ages.
(4) History of Continental Europe, 1800-1648.
(5) English History to 1485.

DIVISION II

(1) English History since 1485.
(2) History of Continental Europe, 1648-1871.
(3) History of Continental Europe since 1871.
(4) History of North America and the United States to 1789.
(5) History of the United States, 1789-1876.
(6) History of the United States since 1876.

DIVISION III

(1) The Expansion of Europe.
(2) The Far East.
(3) The Near East.
(4) Latin-America.
(5) Canada.

In the General Examination, every candidate will be required to pass an oral and written examination on five of the above fields (excluding the one in which his dissertation falls, which will be reserved for the final departmental examination). In defining these five fields, the candidate must select three from either Division I or II, and may select one from Division III. The general examination must be taken not later than the middle of the second Quarter before the Quarter in which the student hopes to take his degree.

It is not intended that the mere taking of courses shall be an adequate preparation for this examination. The candidate will be expected to show a knowledge of each chosen field as a whole, and in addition the power of organization and interpretation which is essential to the pursuit of independent research. A reasonable knowledge of the literature of each field is likewise expected. Consultation with an instructor in each field will assist in intelligent preparation for this examination.

A sixth field, chosen from the above Divisions, to be designated as the field of the dissertation, will be made the subject of an intensive written test in the Final Examination. With the approval of the committee in charge of the General Examination, the

field of the dissertation may be a definite portion of one of the fields listed in the Divisions. This written test will be followed by the Final Oral Examination. At the time of the Final Examination will be given also such written or oral tests as may be deemed necessary on such courses in other departments as may have been included in the approved courses of study. These will normally lie in the other social sciences but may for sufficient reasons be offerings in philosophy, language, literature, or other properly correlated subjects.

All candidates for the Master's degree are required to take at least two Seminaries in History.

All candidates for the degree of Doctor of Philosophy are required to take at least four Seminaries in History, of which two must be in the field of American History and two in the field of European History.

As indicated by the courses in the following announcement, the University offers a large opportunity for graduate work in History. The University Library contains about 25,000 volumes on history and about 10,000 additional volumes in parliamentary, congressional, and other records. Students have access also to large collections in the field of history in other libraries in the city, such as the State Library and the Library of the State Historical Society.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

812. Introduction to Historical Research. Three credit hours. Autumn Quarter. Three class meetings each week. Required of candidates for the Master's degree. Mr. McNeal.

A practice course dealing with the problems involved in the preparation of the Master's thesis. Should be taken during the student's first Quarter in the Graduate School.

Not open to students who have credit for History 601.

813. The Great Historians, to the Nineteenth Century. Three credit hours. Winter Quarter. Required of candidates for the Doctor's degree. Mr. McNeal, with cooperation of other members of the department.

A study of the leading historical writers and schools of Europe, with selected readings from representative writers.

Not open to students who have credit for History 651.

814. The Great Historians of the Nineteenth Century. Three credit hours. Spring Quarter. Prerequisite, History 813. Required of candidates for the Doctor's degree. Mr. Hockett.

A study of the leading European and American writers and schools of history of the last hundred years.

Not open to students who have credit for History 652.

815. Seminary in European History. Three credit hours. Autumn Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Dorn.

A practice course in research. Problem: Germany during the Napoleonic Period.

816. Seminary in European History. Three credit hours. Winter Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Washburne.

A practice course in research. Problem: Russia and the Problem of the Straits (1908-1914).

817. Seminary in European History. Three credit hours. Spring Quarter. This course must be preceded or accompanied by History 812 or 601. A reading knowledge of either French or German required. Mr. McNeal.

A practical course in research. Problem: A critical study of the original sources of some phase of the twelfth and thirteenth centuries.

819. Seminary in American History. Three credit hours. Autumn Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Hockett.

A practice course in research. Problem: Immigrant Contributions to Colonial America.

820. Seminary in American History. Three credit hours. Winter Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Siebert.

A practice course in research. Problem: Problems of the American Revolution.

821. Seminary in American History. Three credit hours. Spring Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Hill.

A practice course in research. Problem: American Policy in the Caribbean since 1898.

HISTORY OF EDUCATION

Office, 204 Education Building

PROFESSORS ANDERSON AND GOOD, ASSISTANT PROFESSOR ECKELBERRY, AND ASSISTANT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: An acceptable course in the history of education.

601. Educational Classics. Four credit hours. Winter Quarter. Two two-hour periods each week. Mr. Anderson.

Readings in Plato, Aristotle, Plutarch, Quintilian, Montaigne.

Not open to students who have credit for History of Education 350 or 351.

602. Educational Classics. Four credit hours. Spring Quarter. Two two-hour periods each week. Mr. Anderson.

Readings in Comenius, Locke, Rousseau, Pestalozzi, Herbart, Froebel.

Not open to students who have credit for History of Education 352 and 353.

605. History of Education in the United States to 1860. Four credit hours. Autumn Quarter. Four lectures each week. Mr. Good.

606. History of Education in the United States since 1860. Four credit hours. Spring Quarter. Four lectures each week. Mr. Good.

607. History of Industrial Education. Two credit hours. Winter Quarter. Two lectures each week. Mr. Anderson.

608. History of the American High School. Two credit hours. Autumn Quarter. One two-hour lecture each week. Mr. Eckelberry.

An historical and comparative study of the American high school.

609. Present-Day Problems in Education, I. Two credit hours. Spring Quarter. Two lectures each week. Mr. Good.

A review in the light of their history of the most noteworthy of recent attempts to solve the most urgent problems in elementary and secondary school education.

†610. **Present-Day Problems in Education, II.** Two credit hours. Spring Quarter. Two lectures each week. Mr. Good.

An historical study of attempts at a solution of the more urgent educational problems of today. A continuation of History of Education 609.

611. **The History of Education in Ohio.** Two credit hours. Autumn Quarter. Prerequisite, History of Education 626. Mr. Eckelberry.

A study of the development of elementary, secondary, and higher education in Ohio as related to the political, social, and economic development of the state.

613. **Comparative Education.** Two credit hours. Winter Quarter. Two lectures each week. Mr. Anderson.

A survey with historical introduction of existing systems of elementary and secondary education in Denmark, Germany, and in certain sections of the United States.

Not open to students who have credit for History of Education 603.

614. **Comparative Education.** Two credit hours. Spring Quarter. Two lectures each week. Mr. Anderson.

A survey, with historical introduction, of existing systems of education in England and France.

Not open to students who have credit for History of Education 604.

617. **Great Teachers.** Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Good.

Comparative and historical studies of the personalities, methods, lives, and times of several eminent teachers: Socrates, Plato, Jesus, Quintilian, St. Augustine, Abelard, Vittorino, Melanchthon, Agassiz, Kold, Arnold, Silliman, and others.

*618. **Nineteenth Century Leaders of Educational Thought in England.** Four credit hours. Spring Quarter. Four lecture hours each week. Mr. Anderson.

A historical study of the educational writings of John Ruskin, Matthew Arnold, Thomas Huxley, John Stuart Mill and other English intellectual leaders of the nineteenth century, who have exerted a wide and profound influence upon the educational thought of our time.

620. **The History of Higher Education.** Two credit hours. Autumn Quarter. Two lectures each week. Mr. Good.

A study of the rise and progress of universities and research institutions in ancient, medieval and modern times; and of their relations to the society which they have served.

623. **History of Pre-Renaissance Education.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, one course in European history, philosophy, or psychology. Mr. Foster.

Not open to students who have credit for History of Education 403.

625. **The History of Modern Education to 1750.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures each week. Prerequisite, one course in European history, philosophy, or psychology. All instructors.

Not open to students who have credit for History of Education 404.

626. **The History of Modern Education since 1750.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures each

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

week. Prerequisite, one course in European history, philosophy, or psychology. All instructors.

Not open to students who have credit for History of Education 405.

***630. History of Western Education.** Three credit hours.

A broad survey of the development of Western Education from its beginnings in the early Mediterranean civilizations up to the present time, giving an account of:

(1) the major cultural changes, by way of background;

(2) the origins of the chief educational institutions and the more important changes that came with changes of conditions;

(3) the gradual upbuilding of a body of educational doctrines, to serve as guiding principles for home and school.

†631. History of Modern Educational Theory. Three credit hours.

A survey of the leading thinkers, beginning with Bacon and Descartes and ending with G. Stanley Hall and John Dewey. Special attention will be directed to the evolution of theory of individual and social life, and doctrines of the learning process, human development, and the integration of personality in so far as these have influenced education aims, methods, curricula, and the organization of schools in the modern world.

†632. Nineteenth Century Reformers. Three credit hours.

The general principles of Pestalozzi, Herbart, and Froebel, with special reference to the reforms of the curriculum, the grading of the school, and the evolution of modern methods of class instruction. The influence of each upon American thought and practice with a view of interpreting present educational tendencies.

†640. Rousseau and Modern Education. Two credit hours.

(1) A critical consideration of the Emile and the other educational writings of Rousseau, as the fountain-head of modern educational theory and practice;

(2) The application made of Rousseau's teaching by Pestalozzi, and the problems Pestalozzi set his successors;

(3) The divergence of the Pestalozzian tradition in the theories and techniques of Herbart and Froebel;

(4) The genetic point of view in education, with special reference to the American Child Study Movement;

(5) The new education of the twentieth century in America and Europe.

†641. The Evolution of the Junior College Movement. Two credit hours.

The development of the American college and university system with emphasis on the period from 1825 to 1890; graduate and professional schools and the development of secondary education so far as these are related to the causes of the junior college, its significance for American education and new problems now confronting the movement.

651. Minor Problems. One to three credit hours. Autumn, Winter, and Spring Quarters. Students must secure the permission of the instructor before registering. Mr. Anderson, Mr. Good, Mr. Eckelberry.

Designed to help students in applying historical methods to the solution of practical problems.

FOR GRADUATES

Prerequisite for Graduate Work: Students must have work in education amounting to at least eighteen hours in order to take graduate work in this department. A reading knowledge of German, French, Latin, or Greek is highly desirable.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Seminary in the History of Education. Two to five credit hours. Autumn, Winter, and Spring Quarters. Required of all students

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

majoring in the history of education. Mr. Anderson, Mr. Good, Mr. Eckelberry.

*805. A Survey of Source Material and of General Literature in the Field of the History of Education Among the Ancient Greeks. Two credit hours. Winter Quarter. Two lectures or conferences each week. Mr. Anderson.

*806. A Survey of Source Material and of General Literature in the Field of History of Education in Western Europe during the Roman and Medieval Periods. Two credit hours. Winter Quarter. Two lectures or conferences each week. Mr. Anderson.

*807. A Survey of Source Material and of General Literature in the History of Education from the Beginning of the Italian Renaissance to the Middle of the Eighteenth Century. Two credit hours. Spring Quarter. Two lectures or conferences each week. Mr. Anderson.

808. A Survey of Source Material and of General Literature in the History of Education from the Middle of the Eighteenth Century. Two credit hours. Spring Quarter. Two lectures or conferences each week. Mr. Anderson.

809. Research in the History of Education. Three to five credit hours. Autumn and Winter Quarters. Prerequisite, at least two hours in History of Education 801. Mr. Anderson, Mr. Good, Mr. Eckelberry.

HOME ECONOMICS

Office, 220 Campbell Hall

PROFESSORS LANMAN AND McKAY, ASSOCIATE PROFESSOR LINDQUIST, ASSISTANT PROFESSORS KENNEDY, DONNELLY, TURNBULL, BANCROFT, HUSTON, MINTON, AND SMITH, MISS RYAN, MISS HUGHES, MISS HEINER, MISS GRANDPREY, MISS DAVIS, MISS GRIFFITH, MISS UFER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in home economics in addition to any prerequisites stated in the description of the courses. Course 602 requires also a course in chemistry; 603 requires also a course in the elements of art; 611 requires also fundamental courses in physiology and agricultural chemistry; 618 requires also a course in economics and sociology; 619 requires also a course in economics; 621 requires also a course in psychology.

601. Clothing. Three credit hours. One Quarter. Autumn, Winter, Spring. Six hours each week for discussion and laboratory. Miss Heiner, Miss Ryan.

This course includes the application of the principles of art to costume for different individuals and purposes. A study is made of the relation of dress to present social and economic conditions.

Not open to students who have credit for Home Economics 501.

602. Textiles. Three credit hours. Autumn Quarter. One hour for class discussion and two two-hour periods each week for laboratory. Elective. Miss Griffith.

A study of the characteristics of textile fibers and fabrics by means of chemical and physical tests. Discussion of recent developments in the field of textiles.

* Not given in 1932-1933.

603. Textiles. Three credit hours. Winter Quarter. Three meetings each week for class discussion, demonstration, and reports. Miss Griffith.

A study of the selection of fabrics with reference to design and use.

†604. Textiles and Clothing. Five credit hours. Prerequisite, experience in teaching clothing or consent of instructor. Miss Heiner.

A course in clothing selection and construction planned to meet the needs of teachers who wish to acquire a knowledge of the recent developments in this field.

***609. Dietaries.** One credit hour. Spring Quarter. Not open to students majoring in home economics. Miss McKay.

Minimum essentials of an adequate diet are considered. Applications are made to food problems of interest to the group.

611. Nutrition. Five credit hours. One Quarter. Autumn, Winter, Spring. Three meetings for class discussion and two two-hour laboratory periods each week. Miss McKay, Miss Hughes.

A study of the fundamental principles of human nutrition and their application to the feeding of individuals and groups under varying physiological and economic conditions.

612. Nutrition. Five credit hours. Spring Quarter. Three two-hour periods each week for class discussion and laboratory; other hours to be arranged. Prerequisite, Home Economics 611. Miss McKay.

A continuation of Home Economics 611. A study of current literature on nutrition. Problems of feeding in connection with overweight, underweight, rickets, diabetes, and other abnormal conditions are discussed.

614. Foods. Three credit hours. One Quarter. Autumn and Winter. Three meetings each week for class discussion and demonstration. Prerequisite, Home Economics 611 and an acceptable course in the principles of economics. Miss McKay, Mrs. Minton.

This course considers problems of the modern home-maker concerning the purchase of food and the planning and preparation of meals.

615. Experimental Work in Food Preparation. Five credit hours. Winter Quarter. Two periods for class discussion and three two-hour periods for laboratory each week. Prerequisite, Home Economics 611. Mrs. Minton.

This course provides an introduction to research through the application of scientific principles to problems involved in food preparation. Additional experimental work in food preparation may be had by registering in Home Economics 701.

616. Nutrition of Infants and Children. Three credit hours. Prerequisite, an acceptable course in nutrition or consent of instructor. Miss Hughes.

A study of the problems involved in the feeding of children. A review of the literature, with laboratory work in planning diets and observations in the Home Economics Nursery School.

618. Buying for the Home. Five credit hours. Winter Quarter. Four meetings each week for class discussion; hours for field work to

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

be arranged. Miss Lindquist, Miss McKay, Miss Ryan, Miss Ufer, Miss Davis.

This course deals with social and economic factors involved in the purchase of clothing and household furnishings. Field work is arranged with wholesale and retail merchants.

619. Household Equipment. Three credit hours. Spring Quarter. Two meetings each week for class discussion; other hours to be arranged. Elective. Prerequisite or concurrent, Home Economics 617 or 626 and 627. Miss Davis.

A study of special problems of household equipment.

621. Child Development. Five credit hours. One Quarter. Autumn, Winter, Spring. Four meetings for class discussion each week; laboratory to be arranged. Prerequisite or concurrent, a course in psychology and in sociology. A course in educational psychology is recommended as a preceding course. Miss Smith, Miss Grandprey.

The nature, development, care and training of the child, and the responsibility of society for providing for the physical, mental, and social needs of the child. The Home Economics Nursery School affords an opportunity for observation and for experience with children.

626. Principles of Home Management. Three credit hours. One Quarter. Autumn, Winter, Spring. Three periods each week for class discussion. Credit will not be given until Home Economics 627 has been completed. Prerequisite, Home Economics 611 and economics. Miss Lindquist.

A study of the management of the various resources available to the family, with a view to securing well-being and satisfaction for the members.

Not open to students who have credit for Home Economics 617.

627. Laboratory in Home Management. Five credit hours. One Quarter. Autumn, Winter, Spring. One conference each week and laboratory to be arranged. Prerequisite or concurrent, Home Economics 621 and 626. Students preparing to teach are advised to schedule Home Economics 642 concurrently. Miss Lindquist, Miss Davis, Miss Ufer.

An application of the principles gained in other courses. Students live for one-half of a Quarter in the home management house and carry the responsibility of homemaking under conditions approximating those of a modern home. Reservations for residence should be made in advance. There is a residence fee for the course.

Not open to students who have credit for Home Economics 617.

630. The Purchase of Foods for Institutions. Five credit hours. One Quarter. Autumn, Winter, Spring. Hours to be arranged. Prerequisite, Home Economics 611, an acceptable course in the principles of economics and consent of the instructor. Mrs. Kennedy.

A study of foods with reference to buying for institutions.

631. Institution Management. Five credit hours. One Quarter. Autumn, Winter, Spring. Credit will not be recorded until the following course, Home Economics 632, has been completed. Hours for discussion and laboratory to be arranged. Limited to ten students. Prerequisite, Home Economics 611 and principles of economics; prerequisite or concurrent, Home Economics 630. Mrs. Kennedy.

This course considers the preparation of food in large quantities, food cost accounting, efficiency problems, use and care of equipment and organization of employees. The

laboratory work will be conducted in the Pomerene Hall Refectory. No other course than Home Economics 630 is to be scheduled with this course.

632. Institution Management. Five credit hours. One Quarter. Winter and Spring. Hours to be arranged. Prerequisite, Home Economics 631 and consent of the instructor; prerequisite or concurrent, Accounting 405 (Outline of Accounting) and Animal Husbandry 407 (Selection and Cutting of Meat). Accounting 606 is recommended as part of the sequence in Institution Management. Mrs. Kennedy.

This course considers administrative problems in various institutions. The Pomerene Hall Refectory, and Women's Dormitories are used as laboratories. Observations are made in restaurants, tea rooms, hotels, schools, and hospitals.

633. School Lunchroom Management. Three credit hours. Spring Quarter. One lecture and four laboratory hours each week. Prerequisite or concurrent, Home Economics 611. Mrs. Kennedy.

This course is arranged for those who wish to be prepared to manage school lunchrooms in connection with their teaching. It consists of a survey of equipment, organization, and management, with observations in city and rural school lunchrooms.

641. Home Economics Teaching. Five credit hours. One Quarter. Autumn, Winter, Spring. Three meetings for class discussion each week; observations to be arranged. Elective for Juniors, Seniors, and graduate students. This course is offered to fulfill in part the requirements for state certification for teaching home economics. It is required that students registering for this course arrange their schedules so that they may have at least two half-days each week for observation trips. Prerequisite, twenty-five Quarter credit hours in required home economics courses; prerequisite or concurrent, five additional hours in required home economics courses. Miss Donnelly, Miss Bancroft.

This course is concerned with methods of teaching home economics, organization of subject matter for various types of schools, management in the classroom and community responsibilities for the teacher. Observations of home economics classes in urban and rural schools are scheduled.

642. Supervised Home Economics Teaching. Seven credit hours. One Quarter. Autumn, Winter, Spring. Hours for supervised teaching and individual conferences to be arranged. Schedule cards for the Quarter must be approved by those in charge of the course. Elective for Seniors and graduate students. This course is offered to fulfill in part the requirements for state certification for teaching Home Economics. Students registering for this course must arrange their schedules so that they may have five half-days each week free for supervised teaching. As soon as schedules are approved by the Registrar each student electing the course should report to Miss Donnelly to fill out a card for student teaching assignments. Prerequisite, Home Economics 641. Concurrent, Home Economics 643. Miss Donnelly, Miss Bancroft and supervising teachers.

This course affords teaching opportunity in urban and rural schools and in social settlements.

643. Problems in the Teaching of Home Economics. Three credit hours. One Quarter. Autumn, Winter, Spring. Three meetings each week for class discussion. Prerequisite, Home Economics 641. Con-

current, Home Economics 642. A course in educational psychology is recommended as part of the sequence in preparation for teaching home economics. Miss Donnelly, Miss Bancroft.

This course includes a consideration of the problems met by teachers of the various phases of Home Economics in junior and senior high schools, part-time and evening schools; and in social service groups.

644. Problems in the Teaching of Home Economics. Three credit hours. Spring Quarter. Three meetings each week for class discussion. Prerequisite, teaching experience in home economics and Home Economics 641. Miss Donnelly.

The consideration of the problems of the experienced home economics teacher, discussion centering around the solution of these problems in the light of modern educational theories and practices.

645. Vocational Home Economics in Secondary Schools. Three credit hours. Winter Quarter. One two-hour meeting each week for discussion. Prerequisite, Home Economics 641 and teaching experience in home economics or consent of instructor. Miss Huston.

Attention is given to the provisions of the vocational education acts as they apply to home economics in secondary schools. Special problems which are met by teachers of vocational home economics are considered.

701. Special Problems in Home Economics. Three to fifteen credit hours for one Quarter or more. To be given in units of three or five hours. Autumn, Winter, and Spring Quarters. One conference or more each week. Prerequisite, twenty-five Quarter-credit hours in the required courses in home economics, and consent of the instructor. Miss Lanman, Miss McKay, Miss Lindquist, Miss Donnelly, Mrs. Kennedy, Miss Turnbull, Miss Ryan, Miss Smith, Mrs. Minton, Miss Heiner, Miss Davis, Miss Griffith.

Reading and reports on home economics topics. Problems chosen for individual study.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Advanced Special Problems in Home Economics. Three to fifteen credit hours for one Quarter or more. To be given in units of three to five hours. Autumn, Winter, and Spring Quarters. Miss Lanman, Miss McKay, Miss Lindquist, Miss Donnelly, Mrs. Kennedy, Miss Smith, Miss Turnbull, Miss Griffith.

Investigational work bearing upon the problems of living, either in the home, the institution or under commercial conditions.

***802. Seminary in Home Economics Teaching.** Three to five credit hours. Prerequisite or concurrent, Home Economics 644 and consent of the instructor. Miss Donnelly, Miss Huston.

A study of special problems in methods and supervision of home economics teaching.

803. Seminary in Foods and Nutrition. Three credit hours. Autumn Quarter. Prerequisite, consent of instructor. Miss McKay, Miss Hughes, Mrs. Minton.

Conferences and reports on topics in foods and nutrition.

* Not given in 1932-1933.

HORTICULTURE AND FORESTRY

Office, 118 Horticulture and Forestry Building

PROFESSORS GOURLEY, PADDOCK, BROWN, AND LAURIE, ASSISTANT PROFESSORS CHADWICK, HOFFMAN, HOWLETT, SHOEMAKER, AND WIESEHUEGEL

Prerequisite for All Courses in This Department: In general, the prerequisites for the "600" courses in pomology, vegetable gardening, floriculture, and forestry are fundamental courses in these subjects and the permission of the instructor, in addition to any prerequisites stated in the description of the courses.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601. Horticultural Plant Breeding. Three credit hours. Winter Quarter. Three recitations each week. Mr. Laurie.

A study of the methods of breeding of horticultural crops; the modification and improvement of plants under cultivation, together with a discussion of the theories of heredity.

602. Experimental Horticulture. Three credit hours. Autumn Quarter. One discussion period and six hours of laboratory work each week. Prerequisite or concurrent, Botany 605-606, except by special permission of the instructor. Mr. Howlett.

This course is designed to study primarily the physiological responses of horticultural plants that have been grown under varying nutritional conditions. The emphasis will be placed upon the observation and examination of the plants themselves. Some of the subjects considered are: nitrate assimilation in horticultural plants, synthesis and reutilization of proteins, photoperiodism, nitrogen-carbohydrate relationships, potassium, phosphorus, and calcium deficiency. In this connection the student will become acquainted with some current research methods of modern departments of horticulture.

603. Experimental Horticulture. Three credit hours. Winter Quarter. One lecture each week and laboratory work. Mr. Shoemaker.

This course is designed to study the simpler technical procedures followed in modern horticultural work. Particular attention is given to measurements of plant responses, breaking the rest period of potatoes and other plants, germination of pollen and pollen tube growth, catalase determination in horticultural material, hardiness and the interpretation of data. Statistical tests are applied to the numerical data accumulated in the course.

604. Fruit Inspection. Five credit hours. Autumn Quarter. Four recitations and one two-hour laboratory period each week. Mr. Paddock.

Nomenclature, classification, and identification of fruits; detailed descriptions, botanical relationships, adaptations, and commercial value of the commercial orchard fruits of the region.

605. The Literature of Horticulture. Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. Mr. Paddock.

A study of the literature of horticulture.

606. Advanced Pomology. Five credit hours. Autumn Quarter. Four recitations and one conference period each week. Mr. Howlett.

This course is designed to study more completely the principles and practices of modern pomology than is possible in the elementary courses. A comprehensive study of the sources of knowledge and of the experimental work upon which these practices are based will be made by discussion, recitation and conference. Experiments being conducted as well as those concluded will be considered. Two or three field trips will be taken.

621. Systematic Vegetable Gardening. Five credit hours. Autumn Quarter. Three recitations and two two-hour laboratory periods each week. Mr. Brown.

A systematic study of the botany, origin, and history of the principal vegetable forms and varieties, including their description, identification, and special characteristics as regards table and market quality, adaptation to soils, and resistance to diseases. The production of new varieties is included.

652. Structure of Vegetables and Ornamental Plants. Three credit hours. Autumn Quarter. One recitation and two two-hour laboratory periods each week. Time to be arranged. Mr. Gourley.

A study of the structure of vegetables and ornamental plants as they relate to the economic production of these crops. The course is designed for advanced students who desire to make a critical study of horticultural materials.

653. Structure of Economic Fruits. Three credit hours. Winter Quarter. One recitation and two two-hour laboratory periods each week. Time to be arranged. Mr. Gourley.

A study of the structure and vascular arrangement of horticultural fruits. The viewpoint and emphasis of this course are designed to familiarize students with the structures that play a part in the development of various types of fruits and the relation of these structures in cultural development, spraying, storage, and culinary use.

701. Minor Investigations. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. All instructors.

This course is for students who desire to work out special problems in the fields of pomology, vegetable gardening, floriculture or forestry. Students will elect work in their desired subjects after a conference with the instructor in charge.

704. Horticultural Seminary. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in horticulture. All instructors.

FOR GRADUATES

Prerequisite for Graduate Work: Candidates must hold the degree of Bachelor of Science in Horticulture or its equivalent.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research. Five to ten credit hours. Autumn, Winter, and Spring Quarters. Graduate students may do investigational work in some phase of the following subjects: pomology, vegetable gardening, plant breeding, floriculture, and forestry. Mr. Gourley, Mr. Brown, Mr. Laurie, Mr. Chadwick, Mr. Hoffman, Mr. Howlett, Mr. Shoemaker, Mr. Wiesehuegel.

INDUSTRIAL ARTS EDUCATION

(See Practical Arts and Vocational Education)

INDUSTRIAL ENGINEERING

Office, 119 Industrial Engineering Building

PROFESSORS YOUNGER AND KNIGHT, ASSISTANT PROFESSOR RICKLY, MR. LEHOCZKY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601. Engineering Organization. Four credit hours. Autumn Quarter. Four recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Younger.

The development of engineering organizations and a study of existing organizations. The differences in the functions of the jobbing and production shops. The coordination and relation of design engineering, research engineering, metallurgical engineering, production engineering, maintenance engineering, tool engineering, and safety engineering, all included under the title of Industrial Engineering.

602. The Laws of Engineering Management. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Younger.

A consideration from an engineering standpoint of the fundamental laws of management.

603. Work Analysis. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Industrial Engineering 623 or advanced practical experience. Mr. Younger.

The analysis of operations used in the manufacture of different engineering products and of work in general. The importance of using proper speeds and feeds in machining and fabrication. Work analysis as a basis for estimating in the choice of materials and in the simplification of design for production.

623. Advanced Machine Work. Three credit hours. One Quarter. Autumn, Winter, Spring. One recitation and six laboratory hours each week. Prerequisite, acceptable courses in elementary and advanced machine work. Mr. Knight, Mr. Rickly.

A course that gives practice corresponding to that of the tool and maintenance division of commercial shops. Tools, jigs, fixtures, development work, and repairs furnish the necessary exercises.

653. Work-Analysis Laboratory. Three credit hours. Spring Quarter. One recitation and five laboratory hours each week. Concurrent, Industrial Engineering 603. Mr. Lehoczky.

Practice and application of time study methods to actual shop conditions. Determination from time study of piece work rates and of production costs. A term report is required of each student. This course must be taken concurrently with Industrial Engineering 603.

661. Production Control Charts. Three credit hours. One Quarter. Autumn, Winter, Spring. Two recitations and one two-hour laboratory period each week. Mr. Lehoczky.

The application of charts and graphs to production problems, organization, management, operation, labor and cost control. Laboratory exercises designed to supplement the theory.

701. Selection of Manufacturing Equipment. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Younger.

The selection of manufacturing equipment. Specialized machines versus standard machines. The growing use of semi-automatic and full-automatic machine tools. Study

of the product as regards machine tool to be used and the possibility of combining operations in one machine.

702. Work Routing. Four credit hours. Winter Quarter. Four recitations each week. Prerequisite, Industrial Engineering 623 or practical experience. Mr. Younger.

The engineering problems involved in the proper sequence in manufacturing operations. Types of plants to secure the best arrangements of equipment and processing. Handling and supervising the product at and between machines.

706. Methods of Waste Elimination. Four credit hours. Spring Quarter. Four lectures and recitations each week. Mr. Younger.

A study of industrial standards, their control and application. Simplification, inspection, waste elimination and allied subjects. Students are required to do contemporary reading and to give reports in class.

712. Principles of Industrial Engineering. Three credit hours. One Quarter. Winter and Spring. Three lectures each week. Mr. Younger.

The development of engineering organizations. Jobbing and production shops. The coordination and organization of engineering functions. Work-analysis and routing. How to select mechanical equipment. Standardization, simplification, and waste elimination.

Not open to students who have credit for Industrial Engineering 601.

751. Tool Engineering. Three credit hours. Autumn Quarter. One recitation and six hours of drawing-room practice each week. Prerequisite, Industrial Engineering 623 or practical experience. Mr. Rickly.

A course in the design of tools, jigs, and fixtures. Attention given to the forms, life and efficiencies of cutting tools. The simple elements of jig design, such as different forms, locating points, clamping devices, and standardized parts, with drawing-room practice leading up to design of the more complicated fixtures.

752. Work-Routing Laboratory. Three credit hours. Winter Quarter. One recitation and two three-hour laboratory periods each week. Concurrent, Industrial Engineering 702. Mr. Lehoczky.

Practice in the work of placing machine tools and laying out departments in their proper sequence for manufacturing specific products to best advantage. Visits to local plants to survey their methods in these respects.

761. Elementary Production Control. Three credit hours. One Quarter. Autumn and Winter. Three lectures and recitations each week. Prerequisite, Industrial Engineering 601 and Mathematics 441. Mr. Lehoczky.

Quantitative analysis from the standpoint of cost control of machines, equipment and labor.

762. Advanced Production Control. Three credit hours. One Quarter. Winter and Spring. Three lectures and recitations each week. Prerequisite, Industrial Engineering 761 and Mathematics 442 (calculus). Mr. Lehoczky.

The application of quantitative methods of control in industry in the fields of inverse relationships, least cost combinations, purchasing quantities, seasonal production and related problems.

763. Production Control Research. Three credit hours. One Quarter. Autumn and Spring. Three meetings each week. Prerequisite,

Industrial Engineering 762 and Mathematics 443 (calculus). Mr. Lehoczky.

Advanced research work in special phases of the work given in Industrial Engineering 761 and 762. Each student is required to complete a project in his chosen field.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "900" group except by permission of the Graduate Council.

900. Industrial Engineering Research. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Mr. Younger.

Research work in the various phases of Industrial Engineering: production control, production economics, time and motion study, shop processes, etc.

ITALIAN

(See Romance Languages and Literatures)

JOURNALISM

Office, Journalism Building

PROFESSORS MYERS AND HOOPER, ASSISTANT PROFESSOR GETZLOE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in journalism in addition to any prerequisites stated in the description of the courses.

607. Newspaper Problems. Two credit hours. One Quarter. Autumn and Spring. One recitation and one laboratory period each week on the Lantern. Mr. Myers.

Consideration of the problems of newspaper work and direction, including advertising and circulation. Individual theses are required.

608. Newspaper Problems. Two credit hours. Winter Quarter. One recitation and one laboratory period each week on the Lantern. Prerequisite, Journalism 607. Mr. Getzloe.

A continuation of Journalism 607.

621. Editorial Writing. Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Mr. Hooper, Mr. Getzloe.

Study of the purpose, form, style, and spirit of the editorial, as well as the responsibility of the writer to the newspaper, the community and the profession. Consideration of current events, practice in news interpretation and other editorial writing, and study of editorial pages.

622. Public Opinion in the Making. Three credit hours. Winter Quarter. Three recitations each week. Mr. Hooper.

Study of the newspaper's part, through news-selection and display, through editorial-writing, and in the dramatic, music and literary departments. Current events and practice editorial-writing.

625. Journalism Practice. Two to five credit hours. One Quarter. A laboratory course in which work is done off the campus.

Credit in this course is given to students who complete, under the supervision of the School of Journalism, not less than six weeks as full-time staff members of a newspaper or newspapers approved by the School. The student writes bi-weekly reports in the progress of his work, these reports to be checked against the report of his employer. The amount of credit given is determined by the amount and character of the work done. Newspaper work is preferred, but employment in allied fields—publicity,

magazine, or house-organ work may be substituted, by permission. This work may be done at any time before the student's graduation.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 716.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

802-803-804. The Newspaper as a Force in Human Progress. Two credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Lectures, individual research, and group discussions participated in by those investigating related subjects. A study of the newspaper in its relation to democracy, and of the outstanding figures in journalism.

808-809-810. Journalism Seminary. Two credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Instructors and students will meet regularly for the presentation and discussion of special problems in the newspaper field, each student making an intensive study of his own problem and writing a report on it.

LATIN LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

MANUAL ARTS

(See Practical Arts and Vocational Education)

MATHEMATICS

Offices, 307, 314, 315, 316, 317, 319 University Hall

PROFESSORS KUHN, RASOR, MORRIS, ARNOLD (EMERITUS), BLUMBERG, RADO, AND WEAVER, ASSOCIATE PROFESSOR MacDUFFEE, ASSISTANT PROFESSORS BAREIS, BAMFORTH, AND LA PAZ

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental course in calculus in addition to any prerequisites stated in the description of the courses. Course 661 requires also a course in physics; 693, a course in the mathematics of insurance.

601. Advanced Calculus. Five credit hours. Autumn Quarter. Five recitations each week. Mr. Weaver.

Selected topics from Advanced Calculus.

607. Introduction to the Theory of Functions of a Complex Variable. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mathematics 601. Mr. Rasor.

The algebra of complex numbers with their corresponding geometric representation; conformal representation; theory of power series; definition and properties of analytic functions; introduction to the theory of functions as developed by Cauchy, Riemann, and Weierstrass.

611. Differential Equations. Five credit hours. Winter Quarter. Five recitations each week. Mr. Kuhn.

***617. Introduction to Modern Mathematics.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, ten credit

* Not given in 1932-1933.

hours in mathematics beyond calculus, or permission of the instructor. Mr. Blumberg.

The principal aim of this course is not the imparting of comprehensive information but the initiation of the student, by means of lectures, collateral reading and problems, into various mathematical domains. The content will be selected from the following fields: graphical and numerical methods, projective geometry, theory of numbers, the mathematical continuum, mathematical foundations, point sets, groups, probability, and relativity.

621. Advanced Euclidian Geometry. Five credit hours. Winter Quarter. Five recitations each week. Mr. Weaver.

Geometric constructions; points, lines and circles associated with a triangle; harmonic ranges and pencils; harmonic properties of the circle; radical axis; pole and polar with respect to a circle; inversion; symmedian points; Brocard points. This is chiefly a problem course in the field of plane geometry, and is of special value to teachers of this subject.

623. Projective Geometry. Five credit hours. Spring Quarter. Five recitations each week. Miss Bareis.

Plücker line coordinates, duality, infinite elements, projection, double ratio, projective coordinates in one and two dimensions, projective transformations, collineations and involutions in one direction, projective properties of conics.

***625. Solid Analytical Geometry.** Five credit hours. Autumn Quarter. Five recitations each week. Given in alternate years. Miss Bareis.

Systems of co-ordinates; planes and lines; types of surface; quadric surfaces; duality.

641. Elementary Theory of Equations. Five credit hours. Autumn Quarter. Five recitations each week. Mr. Kuhn.

Construction with ruler and compasses, numerical equations, determinants, symmetric functions. Text: Dickson's First Course in the Theory of Equations.

661. Vector Analysis. Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, Mathematics 601. Mr. Weaver.

Vector and scalar algebra and geometry, differentiation and differential operators, applications to electrical theory and to mechanics, dynamics, and hydro-dynamics.

†671. Introduction to the Theory of Relativity. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mathematics 661. Mr. Blumberg.

This course will be prefaced by a brief review of those parts of the classical theories of dynamics and physics which are necessary to an understanding of the special theory of relativity, its applications, and the elementary aspects of the general theory of relativity.

***684. Materials and Concepts of Elementary Mathematics.** Five credit hours. Winter Quarter. Five recitations each week.

A critical review of the selection of the materials of secondary mathematics—the history of the development of this material and its underlying concepts. Systems of axioms for algebra; for geometry; the axiom of parallels. The Non-Euclidian Geometries. Construction with ruler and compass. Variables, limits, number, infinity, transcendence.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

*685. **The History of Mathematics.** Five credit hours. Spring Quarter. Five recitations each week.

A survey of the development of elementary and secondary mathematics in ancient, medieval, and modern times, including a sketch of the history and teaching of mathematics in the United States.

691. **Probability.** Five credit hours. Autumn Quarter. Five recitations each week. Given in alternate years. Mr. Morris.

The first half of the course will be devoted to the development of the theory of probability from the standpoint of permutations, combination, choice and chance; the second half to a formal development of the subject as given by Coolidge in "Introduction to Probability."

692. **Finite Differences.** Five credit hours. Winter Quarter. Five recitations each week. Mr. Morris.

An introduction to finite differences; development of the more important methods of interpolation and summation.

693. **Actuarial Theory.** Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, Mathematics 691 and 692. Mr. Morris.

Life contingencies; actuarial principles of fire and accident insurance; workmen's compensation, and pension systems.

694. **Advanced Actuarial Theory.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mathematics 693. Mr. Morris.

Construction of mortality and rate tables, policy values and dividend sheets.

696. **Mathematical Statistics.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mathematics 691. Mr. Morris.

Derivation of statistical formulas by use of the theory of probability; least squares and their application to observational equations; curve fitting.

697. **Statistical Methods of Forecasting.** Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, Mathematics 696. Mr. Morris.

The application of the theory of probability to forecasting; weighting of biometric series by least squares; seasonal variations; curves of trend.

701. **Introduction to Analysis I.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, permission of instructor. Mr. La Paz.

Irrational numbers; fundamental notions of functions of a real variable; differential coefficients; integrals of Riemann and of Stieltjes; infinite series; functions of several variables; theorems of Green, Stokes, etc., applications.

702. **Introduction to Analysis II.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, permission of instructor. Mr. La Paz.

A continuation of Mathematics 701.

703. **Introduction to Analysis III.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, permission of instructor. Mr. La Paz.

A continuation of Mathematics 702.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 735.

* Not given in 1932-1933.

FOR GRADUATES

Prerequisite for Graduate Work: As a qualification for the study of mathematics as a graduate "major" the student must have completed the equivalent of at least two years of college mathematics, including calculus.

It is recommended that students intending to specialize in mathematics, acquire, as soon as possible, a reading knowledge of French, German, and Italian.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

NOTE: Students should consult with instructors before registering for courses open only to graduates.

GRADUATE MATHEMATICS CLUB

The Graduate Mathematics Club fosters interest in the latest advances in Mathematics, its application and its pedagogy. The meetings, which are held fortnightly consist of reports by members of the staff and by graduate students on their own investigations or on recent books or journal articles, and of addresses intended to orient the members of the Club in reference to various mathematical branches of wide scope. As far as possible, the presentation of the papers demands a minimum of technical equipment on the part of the hearers and is on the whole intended to be intelligible to students beginning their graduate work. Since it is the Graduate Mathematics Club which brings into special focus the living, growing character of mathematical science, it is expected that all graduate students of mathematics will cooperate in the work of the Club and attend the meetings regularly.

800. Seminary in Mathematics. Three to five credit hours. Autumn, Winter, and Spring Quarters.

This course consists of conferences, assigned readings, and reports for minor investigations.

801. Reading and Research. Three to ten credit hours each Quarter. Autumn, Winter, and Spring Quarters. Library work and conferences. Prerequisite, the permission of the department.

804. Methods and Problems in the Theory of Real Functions. Five credit hours. Spring Quarter. Five meetings each week. Prerequisite, Mathematics 805 or 812, or equivalent, or permission of the instructor. Mr. Blumberg.

A study of some of the latest aspects of the theory of real functions, with an emphasis on general methods and recent significant problems.

805. Functions of a Real Variable. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mathematics 601. Mr. Blumberg.

The real continuum according to Dedekind, Cantor, and Weierstrass; cardinal and ordinal numbers; descriptive properties of point sets; the classification of functions; modern theories of measure and integration.

806. Theory of Functions of a Complex Variable I. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, three Quarters of graduate work in mathematics, or the permission of the instructor. Mr. Radó.

Fundamentals. Application to Conformal Mapping.

806. Theory of Functions of a Complex Variable II. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Mathematics 806 I. Mr. Radó.

Continuation of Mathematics 806 I.

806. **Theory of Functions of a Complex Variable III.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Mathematics 806 II. Mr. Radó.

Continuation of Mathematics 806 II.

*809. **Infinite Series and Products.** Five credit hours. Autumn Quarter. Five lectures or conferences each week. Prerequisite, ten Quarter-hours of mathematics beyond calculus. Mr. Blumberg.

This course includes selections from the following topics: theories of irrationals; series of positive terms; convergence tests; general series; double series; transformation of series; infinite products; Fourier, Dirichlet and power series; special series; divergent series.

*812. **Point-Sets.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, the permission of the instructor. Mr. Blumberg.

Cardinal number; order type, analysis situs transformation, transfinite induction, descriptive and metric properties of point sets, generalizations to abstract sets; applications to the Theory of Functions of a Real Variable.

*813. **Abstract Sets.** Five credit hours. Autumn Quarter. Five lectures each week. Prerequisite, the permission of the instructor. Mr. Bamforth.

An introduction to the theory of abstract sets including a discussion of distance and of limiting processes in various spaces.

*814. **Methods of Analysis I.** Five credit hours. Spring Quarter. Five lectures or conferences each week. Prerequisite, Mathematics 805, 812, or permission of the instructor. Mr. Blumberg.

The course endeavors to acquaint the student with various guiding principles in mathematical investigation in the field of analysis, with particular reference to the Theory of Functions of a Real Variable.

815. **Methods of Analysis II.** Two to five credit hours. Winter Quarter. One meeting each week. Prerequisite, Mathematics 814. Mr. Blumberg.

This course is a continuation of 814, and aims more particularly to introduce the student to research problems in the Theory of Point Sets and the Theory of Functions of a Real Variable.

†816. **Calculus of Variations.** Five credit hours. Spring Quarter. Five recitations each week.

*817. **Partial Differential Equations.** Five credit hours. Five recitations each week. Prerequisite, permission of the instructor.

A study of partial differential equations of the first and second order, with special attention to the various applications to geometry and physics.

*818. **Parametric Problems of the Calculus of Variations I.** Five credit hours. Autumn Quarter. Five lectures each week. Prerequisite, the permission of the instructor. Mr. LaPaz.

Classical necessary conditions; Jacobi condition and criteria for conjugate points due to Bliss; Imbedding theorems and the Weierstrass sufficiency proof; Hamilton-Jacobi theory; generalizations; applications to Riemannian geometry.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

*819. **Parametric Problems of the Calculus of Variations II.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Mathematics 818. Mr. LaPaz.

A continuation of Mathematics 818.

*822. **Non-Euclidian Geometry.** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Weaver.

The geometry of Lobatschefskij and other allied geometries.

*825. **Algebraic Geometry.** Five credit hours. Five lectures each week. Prerequisite, Mathematics 607 or equivalent. Mr. MacDuffee.

An introduction to the geometry of algebraic curves, Riemann surfaces, and their related Abelian integrals.

827. **Differential Geometry I.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Mathematics 625. Mr. Radó.

Fundamentals. Application to Geodesics.

827. **Differential Geometry II.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Mathematics 827 I. Mr. Radó.

Continuation of Mathematics 827 I.

827. **Differential Geometry III.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Mathematics 827 III. Mr. Radó.

Continuation of Mathematics 827 II.

*828. **Modern Theories in Ordinary Differential Equations I.** Five credit hours. Winter Quarter. Five lectures or conferences each week. Prerequisite, Mathematics 601.

Existence theorems for solutions; properties of solutions as functions of initial values and of parameters; linear differential equations; dynamical systems; applications to physics.

*829. **Modern Theories in Ordinary Differential Equations II.** Five credit hours. Spring Quarter. Five lectures or conferences each week. Prerequisite, Mathematics 828.

A continuation of Mathematics 828.

†830. **Integral Equations.** Five credit hours. Spring Quarter. Five lectures or conferences each week. Prerequisite, Mathematics 829.

831. **Mathematical Methods in Theoretical Physics I.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Mathematics 601 or permission of the instructor. Mathematics 831 and 832 are prerequisite for Physics 860 and 861. Mr. Bamforth.

This course aims to discuss from a mathematical point of view topics which are fundamental in the study of modern theoretical physics, such as series development of arbitrary functions, integral equations, calculus of variations, boundary value problems, and potential theory.

832. **Mathematical Methods in Theoretical Physics II.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Mathematics 831. Mr. Bamforth.

A continuation of Mathematics 831.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

*841. **Finite Groups.** Five credit hours. Spring Quarter. Five recitations each week. Mr. Kuhn.

Substitution groups, abstract groups, finite linear and collineation groups. Text: Miller, Blichfeldt, and Dickson's Theory and Applications of Finite Groups.

*850. **Theory of Numbers.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mathematics 641. Mr. MacDuffee.

Elementary properties of integers and the theory of congruences with simple applications. Galois fields; binary quadratic forms.

Not open to students who have credit for Mathematics 643.

851. **Introduction to Higher Algebra.** Five credit hours. Autumn Quarter. Five lectures or recitations each week. Mr. MacDuffee.

An introduction to the theory of matrices, invariants, and fields.

852. **Algebraic Invariants.** Five credit hours. Winter Quarter. Five lectures or recitations each week. Prerequisite, Mathematics 851. Mr. MacDuffee.

An introduction to the study of invariants of Euclidean and projective transformations and their geometric significances.

*853. **Differential Invariants.** Five credit hours. Spring Quarter. Five lectures or recitations each week. Prerequisite, Mathematics 601, 827, and 852 or equivalent. Mr. MacDuffee.

A course in the theory of invariants of differential forms with applications to differential geometry, and a brief introduction to tensor analysis.

*854. **Continuous Groups.** Five credit hours. Five lectures or conferences each week. Prerequisite, the permission of the instructor.

A study of Lie's theory of r-parameter continuous groups with an introduction to some of the recent investigations of Cartan and Weyl.

*855. **Algebraic Numbers.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Mathematics 850. Mr. MacDuffee.

A study of the arithmetic theory of algebraic numbers and ideals.

*856. **Linear Algebras.** Five credit hours. Spring Quarter. Five lectures each week. Prerequisite, Mathematics 855. Mr. MacDuffee.

A study of linear algebras and their arithmetics, with particular attention to Dickson's theory of hypercomplex integers.

861. **Fourier's Series and Spherical Harmonics.** Five credit hours. Spring Quarter. Five lectures each week. Prerequisite, Mathematics 701, 702, or permission of the instructor. Mr. Bamforth.

Convergence, summability, integration and differentiation of Fourier's Series, expansions of functions in terms of Legendre's Polynominals, and surface spherical harmonics; applications to physics.

862. **Tensor Analysis.** Five credit hours. Spring Quarter. Five lectures or recitations each week. Prerequisite, Mathematics 852. Mr. MacDuffee.

Invariants of differential forms with applications to geometry and the Theory of Relativity; tensors of the Calculus of Variations; physical applications.

* Not given in 1932-1933.

*865. **Functional Operations I.** Five credit hours. Autumn Quarter. Five lectures or recitations each week. Prerequisite, the permission of the instructor.

Functionals, permutable functions, functions of composition; integro-differential equations, functional equations with functional derivatives; groups of functional transformation, invariant functionals, quadratic forms in infinitely many variables, infinite matrices.

*866. **Functional Operations II.** Five credit hours. Winter Quarter. Five lectures or recitations each week. Prerequisite, Mathematics 865.

A continuation of Mathematics 865.

*871. **Minimal Surfaces and the Problems of Plateau I.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, the permission of the instructor. Mr. Radó.

Detailed theory of minimal surfaces from the viewpoint of differential geometry. Discussion and solution of the problem of Plateau.

*872. **Minimal Surfaces and the Problem of Plateau II.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Radó.

A continuation of Mathematics 871.

*873. **Minimal Surfaces and the Problem of Plateau III.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Radó.

A continuation of Mathematics 872.

*891. **Mathematical Theory of Statistics.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mathematics 691. Mr. Morris.

The application of the theory of probability to statistical problems; simple and restricted sampling; errors in statistical constants; partial correlation, etc.

MECHANICAL ENGINEERING

Office, 247 Robinson Laboratory

PROFESSORS MARQUIS, MAGRUDER, NORMAN, AND JUDD, ASSOCIATE PROFESSORS BROWN, BUCHER, AND STINSON, ASSISTANT PROFESSORS FAIRBANKS, MOFFAT, BEITLER, AND ROBERTS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in mathematics, physics, and mechanics in addition to any prerequisites stated in the description of the courses. Courses 607 and 614 require also a course in engineering drawing and 607 requires a year of elementary chemistry.

605. **Heating and Ventilating.** Four credit hours. One Quarter. Winter and Spring. Four recitations each week. Prerequisite, Mechanical Engineering 608. Mr. Brown.

A descriptive and analytical study of the apparatus and machinery and of the layouts used in the heating and ventilating of buildings.

Not open to students who have credit for Mechanical Engineering 551 and 572.

607. **Heat-Power Engineering.** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Marquis, Mr. Bucher.

The beginning of a study of thermodynamics, and of an analytical and descriptive study of steam-generating and steam-using machinery, and of air compression and refrigeration.

* Not given in 1932-1933.

608. Heat-Power Engineering. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mechanical Engineering 607. Mr. Marquis, Mr. Bucher.

The continuation of Mechanical Engineering 607.

609. Heat-Power Engineering. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 608. Mr. Marquis.

The continuation of Mechanical Engineering 608.

614. Mechanism. Four credit hours. Autumn Quarter. Four recitations each week. Mr. Stinson.

A descriptive and analytical study of kinematics, mechanisms, and mechanical movements.

616. Mechanism Drawing. Two credit hours. Winter Quarter. Two three-hour laboratory periods each week. Prerequisite or concurrent, Mechanical Engineering 614. Mr. Stinson, Mr. Moffat.

Drawing-board practice in laying out mechanisms and mechanical movements.

617. Mechanical Engineering Laboratory. Two credit hours. Autumn Quarter. One four-hour laboratory period each week. Prerequisite, Mechanics 605 and 607. Mr. Brown, Mr. Beitler.

The calibration of pressure gauges and indicator springs. Steam engine indicator practice. The operation and testing of steam engines and boilers and of steam and centrifugal pumps.

625. Internal-Combustion Engines. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 608 and 614. Mr. Magruder.

A study of internal-combustion engines and their auxiliaries.

664. Mechanical Engineering Laboratory. Three credit hours. Winter Quarter. One six-hour laboratory period each week. Prerequisite, Mechanical Engineering 607; concurrent, Mechanical Engineering 608 and Mechanics 602. Mr. Brown, Mr. Fairbanks, Mr. Roberts.

The calibration of thermometers, pressure gauges, and other instruments; indicator practice; operation of steam engines; tests of oils, lubricants, the materials of construction, and of steam engines.

665. Mechanical Engineering Laboratory. Three credit hours. Spring Quarter. One six-hour laboratory period each week. Prerequisite, Mechanical Engineering 608 and 664; concurrent, Mechanical Engineering 609 and Mechanics 605 and 607. Mr. Brown, Mr. Fairbanks, Mr. Roberts.

Valve setting, moisture determination in steam, gas calorimetry, measurements of the flow of water by means of orifices, nozzles, weirs, and venturimeters, and tests of steam engines.

704-705. Automotive Engineering. Three credit hours. Winter and Spring Quarters. Three recitations each week. Prerequisite, Mechanical Engineering 756; concurrent, Mechanical Engineering 782-783. Mr. Stinson.

An advanced study of automotive engines, chassis and auxiliaries.

707. Heating and Ventilating Design. Three credit hours. Spring Quarter. One recitation and six hours of practice in computing or draw-

ing rooms, or the equivalent, each week. Prerequisite, Mechanical Engineering 605. Mr. Brown.

The design and preparation of plans and specifications for the various systems used in the heating and ventilating of buildings.

715. Air-Compressing and Refrigerating Machinery. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 609 and Mechanics 605 and 607. Mr. Magruder.

A descriptive and analytical study of air-compressing and compressed-air-using machinery and appliances, of systems of refrigeration and their machinery.

725. Diesel Engines. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 625 or 704. Mr. Stinson.

An advanced study of Diesel-engine design, operation and economics.

Not open to students who have credit for Mechanical Engineering 813.

727. Machine Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mechanics 605 and 607, Mechanical Engineering 609 and 614. Mr. Norman.

A detailed course of study based upon mechanics and the materials of construction applied to the design and construction of machinery.

728. Machine Design. Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. Prerequisite, Mechanical Engineering 727. Mr. Norman.

The continuation of Mechanical Engineering 727.

742. Hydraulic Machinery. Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, Mechanics 603 or 605 and 607, and Mechanical Engineering 609. Mr. Judd.

The application of hydraulic principles to hydraulic machinery.

743. Machine Design. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 728. Mr. Norman.

The continuation of Mechanical Engineering 728.

744. Machine Design. Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week. Prerequisite, Mechanical Engineering 728. Mr. Norman.

The continuation of Mechanical Engineering 728.

746. Steam Turbines. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 609 and 779. Mr. Bucher.

A study of the generation of power by steam turbines, including auxiliary machinery.

754. Hydraulic Power. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanics 605 and 607, and Mechanical Engineering 779. Preliminary to Mechanical Engineering 785. Mr. Judd.

A study of the dynamics, generation, and economics of hydraulic power, including hydraulic turbines and their equipment.

756. Aeronautical and Automotive Engines. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Mechanics 605 and 607, and Mechanical Engineering 625, or 507, or 509, or 574. Mr. Stinson.

A descriptive and analytical study of automotive and aeronautical engines and their auxiliaries.

757. Aerodynamics. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanics 605 and 607. Mr. Fairbanks.

A descriptive and analytical study of the various forms of aircraft and the elementary principles of aerodynamics.

758. Airplane Design. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 757. Mr. Fairbanks.

A study of the principles of the design of airplane structures.

759. Aerodynamics. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 757. Mr. Fairbanks.

An advanced study of aerodynamics.

760. Airplane Design. Two credit hours. Spring Quarter. Two three-hour drawing periods each week. Prerequisite or concurrent, Mechanical Engineering 758. Mr. Fairbanks.

Practice in airplane design.

762. Air Transportation. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 501, (General Aeronautics), or concurrent, Mechanical Engineering 757. Mr. Fairbanks.

A study of airplane transportation; types; ground facilities, and operating costs.

779-780-781. Mechanical Engineering Laboratory. Three credit hours. Autumn, Winter, and Spring Quarters. One six-hour laboratory period each week. Prerequisite, Mechanics 605 and 607, and Mechanical Engineering 609, 625, and 665. Mr. Brown, Mr. Bucher, Mr. Beitler, Mr. Roberts.

Tests of steam engines; steam boilers; gas, oil and automotive engines; air compressors; centrifugal, rotary and power pumps; impulse and turbine water wheels; fans and blowers; steam turbines.

782-783. Automotive Engineering Laboratory. Three credit hours. Winter and Spring Quarters. One six-hour laboratory period each week. Prerequisite, Mechanical Engineering 779. Optional with Mechanical Engineering 780-781. To be taken only by those students who elect Mechanical Engineering 704-705. Mr. Stinson, Mr. Roberts.

Tests of automotive power-plants, and of complete vehicles in the laboratory and on the road, together with heat-balance tests of gas and oil engines.

785. Hydraulic Power Laboratory. Three credit hours. Spring Quarter. One six-hour laboratory period each week. Optional with Mechanical Engineering 781. Prerequisite, Mechanical Engineering 754. Mr. Judd, Mr. Beitler.

A laboratory study of the dynamics of jets, the flow and measurement of water, and the testing of impulse and reaction turbines.

787. Aeronautical Laboratory. Three credit hours. Spring Quarter. One six-hour laboratory period each week. Prerequisite, Mechanical Engineering 757 and 780 or 782. Optional with Mechanical Engineering 781. Mr. Fairbanks.

A study of the experimental determination of air forces and of the strength and stiffness of airplane parts and materials.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate work in this department requires as general prerequisites, collegiate courses in mechanics, strength of materials, steam or gas engines, and a knowledge of the fundamentals of hydraulics.

For major work a candidate must hold a baccalaureate degree in Mechanical Engineering.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research Work. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Time to be arranged with the instructor. Prerequisite, the permission of the instructor in charge. Mr. Magruder, Mr. Marquis, Mr. Norman, Mr. Judd, Mr. Brown, Mr. Stinson, Mr. Bucher, Mr. Fairbanks.

Research work in gas enginery and gas producers and materials of construction is under the supervision of Mr. Magruder; in steam engineering and fuel testing, under Mr. Marquis and Mr. Bucher; in machine design and mechanical vibrations, under Mr. Norman; in applied hydraulics and the flow of fluids, under Mr. Judd; in heating and ventilating, under Mr. Brown; in automotive engineering, under Mr. Stinson; in aeronautical engineering, under Mr. Fairbanks.

805-806-807. Gas Power and Design. Two to five credit hours. Autumn, Winter, and Spring Quarters. Library, conference, and drawing-board work. Prerequisite, courses in gas and oil engines, automotive engineering, thermodynamics, and machine design. Mr. Magruder, Mr. Stinson.

811-812-813. Gas Power and Laboratory Work. Two to six credit hours. Autumn, Winter, and Spring Quarters. One to three four-hour periods each week. Prerequisite, courses in gas and oil engines, automotive engineering, thermodynamics, and machine design; concurrent, Mechanical Engineering 805-806-807. Mr. Magruder, Mr. Stinson.

This course must be taken in groups of at least two and preferably three students.

815-816-817. Steam Power Plants, Economics, and Design. Three to five credit hours. Autumn, Winter, and Spring Quarters. Library, conference and drawing-board work. Prerequisite, courses in power plants, steam engines, turbines, and boilers, and power-plant design. Mr. Marquis, Mr. Bucher.

821-822-823. Advanced Machine Design. Two to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, such courses as may be needed for the particular work. Mr. Norman.

Under this course may be included either special designs, or special subjects in machine design.

825. Mechanical Vibrations. Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, the permission of the instructor in charge. Mr. Norman.

A lecture or conference course in the theory of mechanical vibrations occurring in

machinery and machine elements. Some problems in the computation of vibratory speeds, analysis of modes of vibration, etc.

831-832-833. Advanced Aeronautics. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference, drawing board and laboratory work. Prerequisite, Mechanical Engineering 759, 760, and 787. Mr. Fairbanks.

MECHANICS

Office, 225 Industrial Engineering Building

PROFESSOR BOYD, ASSOCIATE PROFESSOR OTT, ASSISTANT PROFESSORS FOLK AND POWELL, MR. CLARK

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Graduate work in this department requires as general prerequisites, collegiate courses in differential and integral calculus, and a year of general physics.

601. Statics. Five credit hours. One Quarter. Autumn and Winter. Five recitations each week. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Powell, Mr. Clark.

602. Strength of Materials. Five credit hours. One Quarter. Autumn, Winter, Spring. Four recitations and one two-hour laboratory period each week. Prerequisite, a course in statics. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Powell, Mr. Clark.

605. Strength of Materials. Two credit hours. One Quarter. Autumn, Winter, Spring. Two recitations each week. Prerequisite, Mechanics 602. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Clark.

Not open to students who have credit for Mechanics 603.

607. Dynamics and Hydraulics. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Prerequisite, a course in statics. Mr. Boyd, Mr. Folk, Mr. Ott, Mr. Powell.

Not open to students who have credit for Mechanics 603.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate work in this department requires as general prerequisites, collegiate courses in differential and integral calculus, and a year of general physics.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Advanced Theoretical Mechanics. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Mechanics 602. Mr. Boyd.

802. Advanced Theoretical Mechanics. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanics 801. Mr. Boyd.

803. Advanced Theoretical Mechanics. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanics 802. Mr. Boyd.

METALLURGY
Office, 100 Lord Hall

PROFESSORS DEMOREST AND MUELLER, ASSISTANT PROFESSOR LORD

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in physics and metallurgy in addition to any prerequisites stated in the description of the courses. Course 620 requires also a course in descriptive mineralogy.

605. Iron and Steel Metallurgy. Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, Metallurgy 651. Mr. Demorest, Mr. Lord.

Lectures and problem work on the production of iron and steel and the manufacture of iron and steel shapes.

606. Principles of Metallography. Three credit hours. Autumn Quarter. One lecture and five hours of laboratory each week. Prerequisite, one year of college physics and two Quarters of college chemistry. Mr. Lord.

Lectures and laboratory work on the structure and properties of metals. Equilibria of metals are studied by the aid of the microscope.

607. Inspection of Commercial Metals. Three credit hours. Spring Quarter. One lecture and two three-hour laboratory periods each week. Prerequisite, one year of college physics and two Quarters of college chemistry. Mr. Lord.

The application of metallographic methods to the inspection of commercial metals for students not specializing in metallurgy.

610. Non-Ferrous Metallurgy. Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, one year each of college physics and college chemistry. Mr. Mueller.

Lectures, recitations, and problem work on the metallurgy and properties of non-ferrous metals, with special attention to the principles of igneous concentration of the precious metals and study of hydro-metallurgical and electro-metallurgical processes of the present day.

620. Principles of Ore Dressing. Five credit hours. Autumn Quarter. Three lectures or recitations and two three-hour laboratory periods each week. Prerequisite, a course in descriptive mineralogy and one year of college physics. Mr. Mueller.

Lectures, recitations, and laboratory work on the principles of ore dressing, reclamation of minerals and metals, and coal washing.

650. Pyrometry. Two credit hours. One Quarter. Autumn and Winter. One lecture or recitation and one three-hour laboratory period each week. Mr. Demorest, Mr. Lord.

Lectures, laboratory, and problem work on the calibration and use of resistance, thermo-electric, optical, and total radiation pyrometers.

651. Fuels. Three credit hours. One Quarter. Autumn and Winter. Three lectures or recitations each week. Mr. Demorest, Mr. Mueller, Mr. Lord.

Lectures, recitations, and problem work on solid, liquid, and gaseous fuels, their use, preparation, and efficiencies, the thermo-chemistry of combustion and gas equilibria.

652. Gas Testing and Calorimetry. One credit hour. Autumn Quarter. One three-hour laboratory period each week. Prerequisite, one year of college chemistry; concurrent, Metallurgy 651. Mr. Demorest, Mr. Lord.

Laboratory work and problems on the analysis of flue and fuel gases.

655. Technical Gas and Fuel Analysis. Three credit hours. Winter Quarter. One lecture or recitation and two three-hour laboratory periods each week. Mr. Demorest, Mr. Lord.

Lecture, laboratory, and problem work on the analysis of coal, fuel, and flue gas, and mine gases and the determination of the heating values of solid, liquid, and gaseous fuels.

665. General Metallurgy. Five credit hours. Spring Quarter. Five lectures or recitations each week. Prerequisite, two Quarters of college chemistry. Mr. Mueller, Mr. Lord.

Lectures, recitations, and problem work on the metallurgy of iron, steel, copper, lead, zinc, gold, silver, etc., including the principles of igneous, hydro-metallurgical and electro-metallurgical processes for recovery and refining of the common metals.

701. Advanced Metallography. Four credit hours. Winter Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 606. Mr. Lord.

The microscopic examination and micro-photography of normal samples of irons, steels, brasses, with special attention to faults and sources of weakness.

702. Heat Treatment and Special Steels. Four credit hours. Autumn Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 701. Mr. Demorest, Mr. Lord.

Experiments in and microscopic study of normalizing, annealing, quenching, tempering, case-hardening, and working of steels with special attention to alloy steels.

705. Metallurgical Construction. Four credit hours. Winter Quarter. Two lectures or recitations and three two-hour laboratory periods each week. Prerequisite, Metallurgy 651, 605, 720, 610 or 655. Mr. Mueller.

Lectures, recitations, and drawing-room practice on the principles, practice, and design of concentrators and coal-washing plants.

706. Metallurgical Construction. Four credit hours. Spring Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 705. Mr. Demorest, Mr. Lord, Mr. Mueller.

Option: Continuation of Metallurgy 705 with special reference to operation, control, costs, and handling of materials; or lectures, recitations, and drawing-room practice on the principles, practice, and design of metallurgical furnaces and plants with special reference to refractories and heat transfer and to operation, control, costs, and handling of materials.

709. The Principles of Gas Engineering. Five credit hours. Winter Quarter. Three lectures or recitations and three three-hour laboratory periods each week. Prerequisite, Metallurgy 651 and 608. Mr. Demorest.

Lectures, problems and laboratory work on the technology and economics of manufactured gas production and distribution for industrial and public utility uses, and the manufacture of coke.

710. Metallurgical Investigations. Three or five credit hours. Three Quarters. Autumn, Winter, Spring. One recitation or lecture and two or four three-hour laboratory periods each week. Prerequisite, permission of the department. Mr. Demorest, Mr. Mueller, Mr. Lord.

The class is divided into groups for investigation along the lines of their special interests as follows:

(a) The Properties of Metals and Alloys.
(b) Production and Refining of Metals.
(c) Ore Dressing and Coal Washing.
(d) Manufactured Gas and Coal Distillation Processes.

All investigations are under close direction of instructors.

711. Metallurgical Investigations. Five credit hours. Three Quarters. Autumn, Winter, Spring. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 710. Mr. Demorest, Mr. Mueller, Mr. Lord.

A continuation of Metallurgy 710.

720. Ore Dressing. Three credit hours. Winter Quarter. One lecture and two three-hour laboratory periods each week. Prerequisite, Metallurgy 620. Mr. Mueller.

Lectures and laboratory work in the design of flow sheets and concentration practice for ores, and leaching processes.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Advanced Metallurgical Research. Five to ten credit hours. Autumn Quarter. Seminary and laboratory research. Prerequisite, permission of the department. Mr. Demorest, Mr. Mueller, Mr. Lord.

802. Advanced Metallurgical Research. Five to ten credit hours. Winter Quarter. Seminary and laboratory research. Prerequisite, permission of the department. Mr. Demorest, Mr. Mueller, Mr. Lord.

803. Advanced Metallurgical Research. Five to ten credit hours. Spring Quarter. Seminary and laboratory research. Prerequisite, permission of the department. Mr. Demorest, Mr. Mueller, Mr. Lord.

MINE ENGINEERING

Office, 219 Lord Hall

PROFESSORS NOLD AND F. A. RAY (EMERITUS),
ASSISTANT PROFESSOR O'ROURKE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable training in mine engineering in addition to any prerequisites stated in the description of the courses. Courses 601, 760, and 761 require also a course in geology.

601. Prospecting and Preliminary Operations. Five credit hours. Winter Quarter. Five recitations each week. Mr. Nold, Mr. O'Rourke.

Prospecting, boring, use of explosives, shaft sinking, and tunneling.

701. Development and Methods of Mining. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mine Engineering 601. Mr. Nold.

Development, location of openings, methods of mining, supporting excavations, etc.

702. Mine Operations. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mine Engineering 701, Electrical Engineering 630 and 635. Mr. Nold.

Drainage, haulage, hoisting, ventilation, illumination, mine gases, and explosions

703. Mine Examinations and Reports. Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Mine Engineering 702. Mr. Nold.

Mine examinations, estimation of ore reserves, valuation, reports, organization, administration and determination of costs.

711. Mine Design. Five credit hours. One Quarter. Autumn, Winter, Spring. Three recitations and two three-hour laboratory periods each week. Prerequisite, Mine Engineering 702. Mr. Nold, Mr. O'Rourke.

Design of mining plants. The student is given certain data relative to an actual or hypothetical mine, and he designs the plant lay-out and details a building.

721. Petroleum Engineering. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, satisfactory courses in general geology and physics, and permission of the instructor in charge. Mr. O'Rourke.

Prospecting, exploration, drilling methods, and development of fields.

722. Petroleum Engineering. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mine Engineering 721. Mr. O'Rourke.

Production methods, power, gathering systems, preparation of crude for market, storage and transportation. Processes to increase recovery of petroleum from sands.

723. Petroleum Engineering. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mine Engineering 722. Mr. O'Rourke.

Estimation of oil reserves, petroleum prices, valuation reports, organization, administration and cost.

750. Mine Investigations. Three to five credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, consent of the instructor. This course may be repeated until the student has accumulated not to exceed fifteen credit hours. Mr. Nold, Mr. O'Rourke.

(a) Study and Investigation of Some Phases of Mine Development and Operation.
(b) Study of Mine Ventilation and Laboratory Work with Ventilating Equipment.
(c) Study of the Engineering Problems of Petroleum and Natural Gas Exploration, Production, and Transportation.

760. Principles of Mining. Three credit hours. Spring Quarter. Three recitations each week. Mr. Nold.

Recitations and lectures on the principles of prospecting and mining.

761. Explosives and Rock Work. Three credit hours. Winter Quarter. Three recitations each week. Elective for students whose major

work is not in mine engineering. Prerequisite, a course in chemistry and general geology.

Explosives, quarrying, tunnelling, shaft sinking, dredging and excavating machinery.

FOR GRADUATES

Prerequisite for Graduate Work: Students desiring to undertake advanced work in this department should have a thorough working knowledge of chemistry, physics, and mechanics.

For major work a candidate must hold a baccalaureate degree in Mine Engineering.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Mining Investigations. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Prerequisite, the permission of the instructor in charge. Mr. Nold, Mr. O'Rourke.

Library, conference, laboratory, and field work on some phase of mining or mine operations.

MINERALOGY

Office, 115 Lord Hall

PROFESSOR McCAUGHEY, ASSISTANT PROFESSOR BRANT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in crystallography and mineralogy in addition to any prerequisites stated in the description of the courses. Course 611 requires a fundamental course in geology including elementary petrography, 621 a college course in physics covering light. Students following mineralogy and petrography as majors should have as prerequisites fundamental courses in geology, chemistry and physics.

601. Advanced Crystallography. Five credit hours. Spring Quarter. Mr. McCaughey.

Study of the thirty-two crystal groups and their representative crystals. Structure of crystals as determined by X-ray analysis. Laboratory practice with the two circle gomometer in the measurement of crystals and in the drawing and projection of crystals.

605. Thermochemical Mineralogy. Three credit hours, Autumn Quarter. Four credit hours, Spring Quarter. Three or four lectures each week. Prerequisite, an acceptable course in physical chemistry. Mr. McCaughey.

Thermal properties of minerals, their formation and transformation in silicate mixtures.

606. Advanced Thermo-Chemical Mineralogy. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Mineralogy 605. Mr. McCaughey.

Continuation of Mineralogy 605. Formation and solid solution of silicate minerals in multiple component systems.

611. Elementary Microscopic Petrography. Four credit hours. Spring Quarter. Two lectures and two two-hour laboratory periods each week. Mr. McCaughey, Mr. Brant.

Instruction and practice in the use of the petrographic microscope in the identification and study of minerals and rocks in thin section.

621. Microscopic Mineralogy. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. McCaughey.

The use of a polarizing microscope in the identification of minerals in fine powder and thin section. Determination of the optical constants of minerals and crystallized substances with the polarizing microscope.

631. Mineralogical Investigations. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Library, conference, and advanced laboratory work. Prerequisite, Mineralogy 621 or 611. Mr. McCaughey.

(a) Microscopic Petrography. Study and investigation of igneous, metamorphic, and sedimentary rocks in thin section.

(b) Soil Mineralogy. Mineralogical investigation of loose rock, such as soils, sand, and clays.

(c) Applied Microscopic Mineralogy. Application of the principles of microscopic mineralogy to the determination of melting and transformation temperature of minerals; microscopic study of refractories, ceramic products and glasses.

(d) X-ray Crystal Analysis. Practice in the application of X-rays to the study of minerals and crystallized materials. Calculation for and determination of the fine structure of crystals.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research in Mineralogy and Petrography. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference and laboratory.

MUSIC

Offices, 1, 2, 3, 4 Page Hall

PROFESSORS HUGHES, WALL, AND WEIGEL, ASSOCIATE PROFESSORS LEEDER AND WILSON, ASSISTANT PROFESSOR JONES

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Requirements for admission to Graduate work in Music

1. One hundred hours of acceptable academic work, including English, Science, History, Psychology, etc.
   (a) Students majoring in Music Education should also have courses in the theory of education and adequate preparation in the field of Music Education.
   (b) Students majoring in the History of Music should also have a reading knowledge of either French or German sufficient for purposes of research.
2. Seventy hours of the theory of music, including a satisfactory amount of sight-singing and ear-training, harmony, analysis and form, history of music, conducting and instrumentation.
3. Twenty hours of applied music, including
   (a) for majors in Music Education, courses in strings, wood-wind and brass, and a degree of advancement in piano and voice satisfactory to the department.
   (b) for majors in the History of Music, an acquaintance with instrumental literature and performance ability on some instrument (preferably piano) satisfactory to the department.
4. A period of at least one year between the awarding of the bachelor's degree and completion of the requirements for the master's degree, preferably before the beginning of graduate study; this period should be spent in music teaching, and, in the case of majors in music education, must be so spent.

Requirements for the Master of Arts Degree

1. In Music Education
   (a) Music—15 hours from the following group, recommended according to the interest and preparation of the student.

Supervision (612)—3 hours; (613)—3 hours
Conducting (642)—2 hours; (643)—3 hours
History and Appreciation (602)—3 hours; (605)—3 hours
Class Methods and Instruction in Voice (617-618-619)—3 hours
Class Methods and Instruction in Piano (614-615-616)—3 hours

(b) Music—Minor Problems (650)—15 hours
(c) Electives in other fields—15 hours
Under certain circumstances, a part of this requirement may be taken in music.

2. In History of Music
(a) Music
History of Music (602)—3 hours; (605)—3 hours
Music electives, as advised—9 hours
(b) Music—Minor Problems (650)—15 hours
(c) Electives in other fields—15 hours

601. The Romanticists. Four credit hours. Autumn Quarter. Four lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.

The music of the romantic period in Germany and France.

602. Wagner and the Music Drama. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.

Study of the works of Wagner and his contribution to the opera.

603. Modern Music. Four credit hours. Winter Quarter. Four lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.

A brief survey of modern developments with special reference to the composers of France and Russia.

605. History of Choral Music. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.

Choral composers and literature with special consideration of the sixteenth and seventeenth centuries.

Not open to students who have credit for Music 305 and 306.

610. Music in the Junior High School. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, courses in school music for primary and intermediate grades. Mr. Leeder.

Materials, problem discussions, junior high school organizations. A course for supervisors of music or for special music teachers in the junior high school.

611. High School Music. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, courses in school music for primary and intermediate grades. Mr. Leeder.

Materials for musical organizations in the high school. Teaching of the theory of music in the high school. A course for supervisors of music or for special teachers of music in high schools.

612. Supervision of Music in Elementary Schools. Three credit hours. Autumn Quarter. Open to Seniors or graduate students majoring in music. Other persons of maturity and experience may elect this course by permission of the instructor. Mr. Leeder.

A study of the specific problems of music supervision with special attention given to curriculum construction.

613. Supervision of Music in Secondary Schools. Three credit hours. Spring Quarter. Open to Seniors or graduate students majoring in music. Other persons of maturity and experience may elect this course by permission of the instructor. Mr. Leeder.

This course is planned to meet the needs of supervisors of music in the senior and junior high schools. Special problems in the various phases of school music will be considered.

617-618-619. Methods of Class Instruction in Voice. One credit hour. Autumn, Winter, and Spring Quarters. Three recitations each week. Credit for 617 and 618 will be withheld until 619 is completed. Prerequisite, the consent of the instructor. Mr. Wall.

Organization of groups. Selection of materials. Class methods of instruction applicable to students in secondary schools. Observation and practice.

***620. Composition.** Three credit hours. Autumn Quarter. Three conferences each week. Prerequisite, permission of the instructor. Miss Jones.

Original composition, beginning with the simple song forms and advancing according to the ability of the class.

***621. Composition.** Three credit hours. Winter Quarter. Two conferences each week. Prerequisite, Music 620. Miss Jones.

Continuation of Music 620.

***622. Composition.** Three credit hours. Spring Quarter. Two conferences each week. Prerequisite, Music 621. Miss Jones.

Continuation of Music 621.

627. Methods of Class Instruction in Piano I. Three credit hours. Winter Quarter. Three discussion periods each week. Mr. Wilson.

Consideration of the objectives of piano study and of problems involved in teaching piano in classes, with special reference to the public schools.

Not open to students who have credit for Music 614-615-616.

628. Methods of Class Instruction in Piano II. Two credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Music 627. Mr. Wilson.

Supervised observation and conferences.

630. Instrumentation. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, a course in harmony, and an amount of applied music satisfactory to the instructor. Mr. Wilson.

Scoring for brass or wood-wind instruments in small combinations, and for full band.

632. Instrumentation. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Music 630. Mr. Wilson.

Scoring for stringed instruments, for strings in combination with other instruments, and for full orchestra.

635. Instrumentation. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Music 632. Mr. Wilson.

Scoring in modern music, reduction, comparative study of scores.

642. Organization of the School Band and Orchestra: Conducting II. Two credit hours. Winter Quarter. Three meetings each week. Prerequisite, Music 630 and a course in conducting. Mr. Weigel.

Lectures, demonstrations and practice in conducting the larger vocal and instru-

* Not given in 1932-1933.

mental forms. Study of the technical and artistic aspects of conducting. Skill in manipulating the baton. Reading and analysis of scores. Organization of the orchestra and band. Rehearsal procedure and routine.

643. Band and Orchestra Materials: Advanced Conducting III. Three credit hours. Spring Quarter. Three lectures and drill periods each week. Prerequisite, a course in conducting and a knowledge of instruments satisfactory to the instructor. Mr. Weigel.

Survey and study of ensemble literature and instrumental methods suitable for junior and senior high school use. Advanced problems in conducting and interpretation. Conducting from full score. Each student is given practical experience in conducting the Departmental Orchestra.

†646. Advanced Vocal Conducting. Three credit hours. Prerequisite, consent of the instructor.

Organization and rehearsal technique of the accompanied chorus and the *a capella* choir. Materials selected from the sixteenth and seventeenth century *a capella* writers, the polyphonic period and the best modern composers. Practice in conducting vocal compositions.

650. Minor Problems. One to five credit hours. All Quarters. Prerequisite, the consent of the department. All instructors.

Investigation of minor problems in the field of music.

OPERATIVE DENTISTRY

Office, Hamilton Hall

PROFESSORS SEMANS, BOTTENHORN, AND GRAHAM, ASSISTANT PROFESSORS HEBBLE, JONES, KITCHIN, AND SNYDER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

701-702-703. Minor Problems in Operative Dentistry. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, adequate preparation in technical courses concerned. Mr. Semans, Mr. Bottenhorn, Mr. Graham, Mr. Hebble, Mr. Jones, Mr. Snyder, Mr. Kitchin.

Students will have assigned to them special problems in Operative Dentistry.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Research in Operative Dentistry. Autumn, Winter, and Spring Quarters. Prerequisite, adequate preparation in technical and practical courses in operative dentistry. Mr. Semans, Mr. Bottenhorn, Mr. Graham, Mr. Hebble, Mr. Snyder, Mr. Kitchin.

Research relating to and found in the various endeavors concerning treatment and restoration to normal conditions of teeth and their contiguous parts.

PATHOLOGY

Office, Hamilton Hall

PROFESSORS SCOTT AND SPOHR, ASSISTANT PROFESSOR REINHART, MISS MILLER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Permission of the instructor in addition to any prerequisites stated in the description of the courses. Courses 600-621 inclusive

† Not given during the academic year, 1932-1933.

are open only to students who are doubly registered in the College of Medicine and the Graduate School, to the extent of fifteen Quarter hours.

600. General Pathology. One credit hour. Autumn Quarter. One lecture each week. Prerequisite, Anatomy 624. Mr. Scott, Mr. Reinhart.

An introduction to pathology, covering the history of pathology, etiology and the nature of disease, degeneration, regeneration and inflammation.

601. General Pathology. Three credit hours. Winter Quarter. One lecture and six laboratory hours each week. Prerequisite, Anatomy 624. Mr. Scott, Mr. Reinhart.

Pathology of inflammatory, regenerative, and retrogressive lesions.

602. Special Pathology. Five credit hours. Spring Quarter. Two lectures and nine laboratory hours each week. Prerequisite, Pathology 601. Mr. Scott, Mr. Reinhart.

Pathology of the special organs and tumors.

603. Clinical Pathology. Three credit hours. Autumn Quarter. Two lecture and four laboratory hours each week. Prerequisite, Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Spohr, Miss Miller.

Sputum, urine, spinal fluid, gastric contents, feces, animal parasites and ova, transudates and exudates, blood cultures, blood typing and matching, miscellaneous examinations.

604. Clinical Pathology. Three credit hours. Winter Quarter. Two lecture and four laboratory hours each week. Prerequisite, Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Spohr, Miss Miller.

Blood, a study of unstained and stained specimens. Special blood pathology. Blood chemistry and functional tests. Sero-diagnostic methods.

605. Surgical Pathology. Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Reel.

A course correlating the symptomatology with the operative specimen.

606. Medical Pathology. Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Reinhart.

A course correlating the symptomatology with the post-mortem pathology.

607. Post-Mortem Demonstration. One credit hour. One Quarter. Autumn, Winter, Spring. Mr. Scott, Mr. Reinhart.

608-609-610. Advanced Pathology. Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601-602 and Bacteriology 641-642. Mr. Scott, Mr. Reinhart.

Autopsy technique.

611-612-613. Advanced Special Pathology. Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601-602 and Bacteriology 641-642. Mr. Scott, Mr. Reinhart.

Minor problems in pathology.

614-615. Experimental Pathology. Three to five credit hours. Winter and Spring Quarters. Prerequisite, Pathology 601-602, 603-604, and Bacteriology 641-642. Mr. Spohr.

Experimental infections and immunity as applied to medicine.

616-617-618. Advanced Clinical Pathology. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 603-604. Mr. Spohr, Miss Miller.

Study of materials collected in the hospital wards and out-patient departments.

619-620-621. Neuropathology. One credit hour. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601 and 602. Mr. Scott.

The gross and microscopic lesions of the nervous system.

653-654. Clinical Pathology. Three credit hours. Autumn and Winter Quarters. One lecture and four laboratory hours each week. Prerequisite, acceptable courses in bacteriology and chemistry. Mr. Spohr, Miss Miller.

A study of the changes in the blood, secretions, serums, and exudates of the body brought about by disease.

660. Pathology Lectures. One credit hour. Autumn Quarter. One lecture each week. Prerequisite, Zoology 609 and a course in microscopic technique. Mr. Scott, Mr. Reinhart.

A discussion of the effects of infection, irritation, and the changes of nutrition upon the tissues of the body, and the theories and classification of tumors.

661. General Pathology. Three credit hours. Winter Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in anatomy, bacteriology, and physiology. Mr. Scott, Mr. Reinhart.

A laboratory course presenting the histological changes resulting from the pathological processes discussed in Pathology 600.

662. Special Pathology. Five credit hours. Spring Quarter. One lecture and nine laboratory hours each week. Prerequisite, Pathology 601. Mr. Scott, Mr. Reinhart.

The gross and microscopical study of the lesions in the organs of the body illustrating the course and results of various diseases.

666. Pathologic Technique. Three credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite, a course in microscopic technique or Zoology 609. Mr. Reinhart and assistant.

The technique of preparing and the staining of surgical tissues for immediate diagnosis, supra-vital staining.

667. Pathologic Technique. Three credit hours. Spring Quarter. Six laboratory hours each week. Mr. Scott, Mr. Hamilton.

The methods of preservation and mounting of specimens for museum purposes, microphotographic technique.

FOR GRADUATES

The prerequisites for the "800" courses in Pathology are adequate courses in pathology or clinical pathology done in any acceptable medical school with prerequisites equivalent to the requirements in this department.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

810-811-812. Research in Pathology. Three to five credit hours. Prerequisite, acceptable courses in pathology, bacteriology, and physiology. Mr. Scott, Mr. Reinhart.

Research problems in pathology.

813-814-815. Research in Clinical Pathology. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 653-654 or equivalent. Mr. Spohr, Miss Miller.

Research problems in clinical pathology.

PHILOSOPHY

Office, 320 University Hall

PROFESSORS LEIGHTON, CHANDLER, AND AVEY, ASSISTANT PROFESSOR HALL, MR. LEVINGER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Courses bearing numbers 601 to 650 are historical; courses bearing numbers 651 to 700 are systematic.

601. Ancient Philosophy. Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Chandler.

The development of philosophical thought from the Greeks to the Middle Ages. Most of the time is devoted to Greek Philosophy. A natural continuation of this course will be found in Philosophy 602; a more specialized treatment of medieval philosophy will be found in Philosophy 609.

602. Modern Philosophy. Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Leighton.

The development of philosophical thought from the Renaissance to the middle of the nineteenth century. A natural continuation of this course will be found in Philosophy 603.

603. Contemporary Philosophy. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Philosophy 602. Mr. Leighton.

The development of philosophical thought from the middle of the nineteenth century to the present.

***607. Development of Hebrew Ideas in the Old Testament.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Avey.

Methods of scholarly study of ancient historical documents are considered, and then applied to the writings of the Old Testament for the purpose of determining their chronological order. On this basis is developed a history of Hebrew ideas, including early tradition; the ideals of the prophets; legal formalism; religious poetry; the Messianic hope.

608. Philosophy and Poetry. Three credit hours. Autumn Quarter. Prerequisite, two courses in philosophy. Mr. Chandler.

A discussion of Lucretius, Dante's "Divine Comedy," and Goethe's "Faust," for the light they throw on the history of thought and the nature of poetic excellence.

609. Medieval Philosophy. Three credit hours. Winter Quarter. Prerequisite, Philosophy 601, 607 or 610. Mr. Levinger.

The development of philosophical thought from the Church Fathers, through the Arabic, Jewish and scholastic writers, to the Renaissance. A natural continuation of this course will be found in Philosophy 602.

†610. Origins of Christian Thought. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Philosophy 601, 607, or 611. Mr. Avey.

A historical inquiry into the content and meaning of the psychological, ethical, and metaphysical teaching of the New Testament with an inquiry into the development of Christian thought up to the formation of the Nicene Creed.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

611. Origin and Development of Religious Ideas. Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Avey.

A general survey of the fundamental ideas of the most important historical religions, including primitive beliefs: Brahmanism; Buddhism; Confucianism; Mohammedanism; Judaism; the various forms of Christianity.

623. Plato. Three credit hours. Autumn Quarter. Prerequisite, three Quarters in philosophy, including Philosophy 601. Mr. Chandler.

Selected dialogues of Plato will be studied in Jowett's translation with reference to their permanent significance for philosophy, literature, and politics.

624. Aristotle and Plotinus. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Philosophy 623. Mr. Chandler.

Selections from the writings of Aristotle and Plotinus will be studied with reference to their permanent signifiance for philosophy.

***625. Representative Pre-Kantian Philosophers.** Three credit hours. Winter Quarter. Prerequisite, Philosophy 602.

A few representative works of classic thinkers of the period from Bacon and Descartes to Kant will be selected for intensive study.

***626. Representative Post-Kantian Idealists.** Three credit hours. Winter Quarter. Prerequisite, Philosophy 602. Mr. Leighton.

A few representative works of classic idealists of the period from Kant to Schopenhauer will be selected for intensive study.

627. Nineteenth Century Empiricists. Three credit hours. Autumn Quarter. Prerequisite, Philosophy 602. Mr. Hall.

A study of John Stuart Mill and other positivists, and Herbert Spencer and other philosophical evolutionists.

650. Elements of Symbolic Logic. Three credit hours. Spring Quarter. Prerequisite, a course in logic. Mr. Avey.

A continuation of the study of logic for students who wish to become acquainted with recent methods of representing logical concepts by means of symbols and with their manipulation in deductive processes.

652. Philosophy of Science. Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, a fundamental course in philosophy and a course in logic. Mr. Hall.

A study and critical discussion of a few general interpretations of the methods and basic assumptions of the natural and social sciences.

653. Philosophy of Religion. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, one of the following: Philosophy 601, 602, 607, 610, 611, 656. Students are advised to take Philosophy 611 (Origin and Development of Religious Ideas) as a background for this course. Mr. Avey.

The psychical and social nature of religion; a systematic examination of the fundamental religious conceptions—the idea of God in relation to the idea of the world, the idea of man, and the problem of human destiny.

* Not given in 1932-1933.

655. **Esthetics.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, one course in philosophy and one course in psychology. Mr. Chandler.

A study of the various fine arts including music and literature, and of the beauty of nature, with the aim of discovering their relation to human nature, their respective limitations, and their value for individual and social life.

Not open to students who have credit for Philosophy 415.

656. **Principles of Social Ethics.** Three credit hours. Spring Quarter. Prerequisite, one of the following: a fundamental course in philosophy and a course in ethics, Philosophy 601, 602, 607, 611, two Quarters of psychology or of sociology. Mr. Leighton.

Systematic development of a philosophy of human values, and its application to the chief forms and activities of civilized life—industrial and economic activities, the state, education, culture, and religion. Emphasis is laid on the social function of education as being the most important instrument of individual welfare and social progress.

Not open to students who have credit for Philosophy 406.

*657. **Mathematical Logic.** Three credit hours. Autumn Quarter. Prerequisite, Philosophy 650, or a course in elementary logic, or six Quarters of college mathematics. Mr. Avey.

A study of some of the outstanding recent works in the field; reports; discussions.

658. **Ethical Problems Underlying the Professions.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Avey.

A critical study and discussion of the problems of ethics basic in the professions (Law, Medicine, Teaching, etc.).

660. **Minor Problems.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, four Quarters in philosophy. Mr. Chandler, Mr. Avey, Mr. Hall.

Investigation of minor problems in the history of philosophy or systematic philosophy. Students ordinarily expect to take this course for from two to five credit hours, but Honors students may receive credit up to ten credit hours.

661. **Metaphysics of Knowledge and Nature.** Three credit hours. Autumn Quarter. Prerequisite, two of the following: Philosophy 601, 602, 603, 625, 626, or the consent of the instructor. Mr. Leighton.

A systematic consideration of the nature of scientific method and the scientific conception of nature in its bearings on the problems of man.

662. **Metaphysics of Personality and Values.** Three credit hours. Winter Quarter. Prerequisite, two of the following: Philosophy 601, 602, 603, 625, 626, or the consent of the instructor. Philosophy 661 will ordinarily precede this course. Mr. Leighton.

A systematic consideration of the nature of the self and society, the problem of values, and the problem of the meaning of existence as a whole.

FOR GRADUATES

Prerequisite for Graduate Work: The courses named below presuppose good foundation courses either in psychology, logic and ethics or in the history of philosophy, and, in some cases, in all of these subjects. Prospective students are likewise strongly recommended to prepare for graduate work in this department by taking related courses in other departments. Psychology is regarded as related to all courses in philosophy. The following are suggested as related courses in other departments. For students of

* Not given in 1932-1933.

logic and metaphysics: mathematics, and natural sciences, especially general and theoretical physics, general and historical chemistry, and evolution (Zoology 509); for students of ethics and the philosophy of religion: sociology, politics, and history; for students of the history of philosophy: European history, and the history of Greek, German, English, and French literatures. Students proposing to specialize in philosophy must previously have completed the equivalent of at least eighteen Quarter-credit hours in philosophy and psychology. In case of students whose main interest is ethics, two Quarters' work in the principles of sociology may be accepted in partial fulfillment of the above requirement.

Candidates for the Ph.D. degree in Philosophy are required to present themselves for general examinations in the elements of the entire subject, and also for more intensive examinations on six of the following subdivisions:

1. Greek philosophy through Aristotle
2. Graeco-Roman philosophy from the death of Aristotle to Plotinus
3. Modern philosophy through Kant
4. Modern philosophy from Kant to 1900 (including Kant)
5. Ethics
6. Social and Political Philosophy
7. Methodology of the Sciences
8. Symbolic logic
9. Theory of knowledge
10. Metaphysics
11. Aesthetics
12. History and Philosophy of religion

The candidate's choice of topics shall be made in consultation with the department, and shall be relevant to the topic of his thesis.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Seminary in Systematic Philosophy. Five credit hours. Autumn Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor. Mr. Leighton.

802. Seminary in Systematic Philosophy. Five credit hours. Winter Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor. Mr. Chandler.

803. Seminary in Systematic Philosophy. Five credit hours. Spring Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor. Mr. Chandler.

***805. Scientific Method.** Five credit hours. Autumn Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor.

The course aims to describe the main logical methods used by the sciences, to consider the relation of methods to different subject matters and different scientific purposes, and to compare the types of science arising from these differences.

***806. Epochs in the History of Thought.** Five credit hours. Winter Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor. Mr. Leighton.

A study of the development of the chief reflective standpoints for the interpretation of nature and man in Western thought from the emergence of Naturalism in Greek thought to the present.

809-810-811. Research. Three to ten credit hours in each Quarter. Autumn, Winter, Spring. Mr. Leighton, Mr. Chandler, Mr. Avey, Mr. Hall.

Properly qualified students may pursue research in any Quarter under the guidance

* Not given in 1932-1933.

of the department, with suitable credit. Candidates for the Ph.D. degree in philosophy are expected to carry on a research problem, either preparatory to the thesis or in connection with it, in every Quarter of residence.

*815-*816-*817. **Seminary in Social and Political Philosophy.** Five credit hours. Autumn, Winter, and Spring Quarters. Three class meetings each week, a fourth and fifth at the option of the instructor.

A critical consideration of the conceptions of the leading philosophers of western civilization on the ideals and principles of social organization.

*820. **Philosophy of History.** Five credit hours. Autumn Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor. Prerequisite, any two of the following: Philosophy 601, 602, 605, 656. Mr. Leighton.

A discussion of the place of history in the system of human knowledge, the humanistic significance of the historical attitude, the concepts of civilization, culture, development and progress. The aim of the course is to formulate a philosophy of culture.

Not open to students who have credit for Philosophy 665.

PHONETICS (DIVISION)

Office, 324 Derby Hall

PROFESSOR RUSSELL, MISS MASON

NOTE: Students from any department interested in either the research problems or numerous professions and fields concerned with speech and hearing in their varied ramifications are now permitted either to major or minor in phonetics and cover a comprehensive program dealing with speech as such, without following the vaguely related requirements in literature, optics, etc., as heretofore required. Such students would do well to consult, at their earliest convenience, with the director of phonetics laboratories, possible professors in courses likely to interest them, and chairmen or advisers of the various allied departments.

Speech Correction. Students who desire to prepare for private practice, school, or clinical work in speech correction will take other necessary courses in abnormal psychology, anatomy, public speaking and dramatic art, public health and hygiene, education, etc.

Teachers of the Deaf. Students aiming to prepare as state or public school teachers of the deaf, or undertake private practice in the field will find additional help in the departments of public health and hygiene, genetic and abnormal psychology, physiology, sociology, education, etc.

Americanization Work. Students interested primarily in Americanization work and the correction of foreign brogue, will naturally choose supporting subjects in other departments such as history, sociology, political science, English, etc.

Scientific Aspects of Speech and Hearing. Students interested in the various scientific aspects of speech and hearing, whether of a pure research or practical nature, should make liberal choice of supporting courses in physics, communication engineering, psychology, physiology, anatomy, etc.

Pronunciation Aspects of Foreign or Native Languages. Students interested in the phonetics or pronunciation aspects of given foreign or their native languages will pursue basic supporting courses in the department in question.

Laboratories. The phonetics personnel, laboratories, speech and hearing clinic, apparatus, and phonographic archives are intended to serve all departments. The practical phonetics laboratories and staff likewise serve all language departments in improving modern language and speech instruction, by teaching a student to speak or hear as he would in a foreign country.

Clinics. The free speech, voice, and hearing clinic is designed to aid all teachers in avoiding class failures wherever they desire to refer students and is open to all citizens

* Not given in 1932-1933.

of the state. Those wishing information about the clinic should report to room 324, Derby Hall, or telephone UN-3148; Campus 324.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

*601. **Sound: Laboratory Phonetics.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Alternating with Phonetics 622 and 625. Mr. Russell.

Study and analysis of sound in its physiological aspects. Training in the observation, recording and analysis of speech.

610. **English Phonetics.** Three credit hours. Winter Quarter. Three hours of lectures and drill each week. Mr. Emsley.

The chief types of cultivated American pronunciation will be studied, some specimens of popular dialect examined, and the historical background of both traced. Practice in reading and writing phonetic texts.

615. **Americanization Phonetics.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, satisfactory courses in the field of the problem and permission of the instructor. Lectures, laboratory, and library work. Mr. Russell.

A study of the defects involved in the English of the foreigner and methods of correction. Laboratory work to that end. A course designed especially for the foreign students on the campus looking to a correction of their phonetic defects of speech; and also for those interested in a study of the means of such correction and the usage of the phonetic laboratory equipment involved, especially Americanization teachers.

*622. **History of Experimental Phonetics.** Five credit hours. One Quarter. Autumn, Winter, Spring. Lectures, library, and laboratory work. Alternating with Phonetics 601 and 625. Mr. Russell.

A consideration of the historical attempts at an experimental analysis of the scientific problems involved in human speech. The laboratory work will be dedicated to duplication by each student of the most basic of those experiments. This course is designed as a preliminary to all courses in phonetics, philology, teaching of language, psychology of language, telephone and radio communication, pathology of speech defects, etc.

625. **Speech and Hearing.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Lectures, library, and laboratory work. Alternating with Phonetics 601 and 622. Mr. Russell.

A basic course for all interested in any aspect of speech research or teaching of speech, foreign languages, correction of foreign accent and speech defects in general. Special attention will be given to the problem involved in teaching the deaf, testing hearing and recently developed apparatus used therefore. Also to the problems of philology or rather the historical study of the phonology of various languages and the manner in which apparatus may be used to record and interpret the most basic facts of pronunciation as it now exists in these various languages.

630. **Technique of Speech Correction in Elementary Schools.** Five credit hours. Spring Quarter. Prerequisite, satisfactory courses in the field of speech and permission of the instructor. Mr. Russell and assistants.

Lectures, clinical demonstrations, observation in class, public schools, and institutions and in the demonstration speech improvement class. Practice in diagnosis and correction of the more common speech defects among public school children.

* Not given in 1932-1933.

635. Work with the Deaf and Hard of Hearing. Five credit hours. One Quarter. Autumn, Winter, Spring. Lectures, library, and laboratory work. Prerequisite, permission of the instructor. Miss Mason.

Problems of auricular and visual interpretation of speech; training in articulation and voice quality with its pitch modulation or normal intonation. Psychology of the individual. Training in lip reading. Practice in the giving of hearing tests, with whispered and voiced speech technique, tuning forks, Western Electric 4-A and 2-A Audiometers, gamut scales and watch-ticks. Other such drill as the teacher and public health nurse needs.

640. Correction of Stammering and Stuttering. Five credit hours. Winter Quarter. Lectures, library, and laboratory work. Prerequisite, permission of the instructor. Mr. Russell.

Consideration of the various theories advanced as to the cause of the impediment. Training in office practice; case-taking including personal, family, school, social, traumatic, pathological, psychological, phonetic, and other needed history; clinical records or progress, checks, and general prognosis with necessary causative analysis and citation. Advanced students may be given actual clinical and laboratory practice in correction, and may be permitted to follow this course with directed research in the field.

700. Human Speech: Minor Research. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Conference, library, and laboratory work. Prerequisite, satisfactory courses in the field of the problem undertaken. A student may repeat this course and spend such time as the problem calls for during the Quarter. Mr. Russell.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the University for carrying out a minor or preliminary investigation, or for adding to his knowledge and technique in any phase of the study of human speech and sound as related thereto, or of the mechanism involved in its production, or of its known defects and their correction.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

800. Phonetic Research: Major Problems. Three to five credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, acceptable courses in the chosen field of research, and demonstrated ability to pursue independent investigation in that field. Credit dependent on the time spent and the type of work done. Mr. Russell.

Designed for those desiring to pursue advanced research in the general field of scientific phonetics.

PHYSICAL EDUCATION

FOR MEN

Office, The Gymnasium

PROFESSORS ST. JOHN AND WILCE, ASSISTANT PROFESSORS HINDMAN, METCALF, AND DUFFEE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in physiology in addition to any prerequisites stated in the description of the courses. Course 630 requires also a fundamental course in physical education; 683, a fundamental course in psychology; 691, a fundamental course in anatomy; and 692, a fundamental course in chemistry.

†601. **Principles of Football Coaching and Management.** Three credit hours. Prerequisite, coaching experience.

A course for advanced students of football. The course will consider the principles underlying various types of football strategy, the designing of plays, methods of teaching and controlling players; also, special problems of management, such as those connected with selecting, handling equipment, and making trips.

621. **Principles of Physical Education.** Five credit hours. Winter Quarter. Prerequisite, ten hours of physiology or equivalent biological training; Physical Education 441, 442, 443 (Theory and Practice of Physical Education), or equivalent. Miss Hersey.

The nature of physical education, especially in relation to overlapping fields, such as health education and community recreation, and to education in general. A critical analysis of various objectives advanced; a review, with applications to physical education of modern conceptions of education and of modern principles in psychology and physiology.

Not open to students who have credit for Physical Education 683.

625. **Tests and Measurements in Physical Education and Health.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Hindman, Mr. .....

A critical study of various specific tests and types of tests, including those designed to measure health, organic efficiency and neuromuscular capacity or proficiency. Among the tests studied will be those of Schneider, Brace and Rogers, and a number of efficiency standards in use in public school systems and elsewhere.

†626. **Supervision of Health and Physical Education.** Three credit hours. Winter Quarter. Three lectures each week.

A study of the opportunities and problems of the supervisor in city and county school systems; the relations of the supervisor to the superintendent and to the teacher; rating teachers; methods of assisting teachers.

630. **Individual Physical Education.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Metcalf.

Making a physical education program meet the needs of handicapped individuals, fundamental principles in the selection and adaptation of activities in corrective procedures, abnormal physical conditions that come to the care or attention of the physical educator, methods of examining and determining individual needs, activity program of both formal and informal character to meet the needs in schools and colleges, will be the problems dealt with in this course. The problems will be discussed in the light of modern objectives of education and particularly individual physical education. There will be lectures, recitations, demonstrations, term projects, and occasional trips to various orthopedic hospitals for observation purposes.

643. **Principles of Health Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physical Education 692. Miss Palmer.

An interpretation of the meaning of health education and its relation to physical education and to general education.

644. **Methods of Health Instruction.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physical Education 643. Miss Palmer, Mr. Metcalf.

This course deals with the organization, material, and methods of instruction in the public schools.

† Not given during the academic year, 1932-1933.

†645. **Administration of Physical Education for Administrators and Supervisors.** Three credit hours.

A course for high school principals and city superintendents dealing with problems of organization and management of physical education activities.

649. **Camping: Its Organization and Administration.** Three credit hours. Spring Quarter. Lectures, readings, and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is an elective given jointly by the Departments of Physical Education and Sociology. Prerequisite for Social Administration students, Sociology 645. Prerequisite for Physical Education students, Sociology 401, 402, and fifteen hours in the Theory and Practice of Physical Education. Mr. Mason, Mr. Metcalf, Miss Alway.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstrations in camping will be included.

This course is the same as Sociology 649.

651. **Minor Problems in Physical Education.** One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, twenty-five credit hours in physical education. Before registering, students must secure permission of instructor. Mr. Hindman.

Investigation of minor problems in the field of physical and health education.

682. **Organization and Administration of Physical Education.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Physical Education 683. Mr. St. John, Mrs. Lydia Clark Benedict.

A consideration of the problems of organization for physical education in elementary and secondary schools and colleges, including standards and methods in administration of interscholastic, intercollegiate, and intramural athletics. The first eight lectures will deal with problems common to both men's and women's work. Thereafter, the women's classes will be conducted separately, with emphasis on problems peculiar to this field. The personnel of a department, athletic and gymnastic facilities, and construction, purchase and care of equipment, keeping of records and reports, handling of finances, schedule making, publicity, insignia and awards, managerial systems, scholastic and athletic eligibility, and professionalism will be included in the problems discussed.

683. **History of Physical Education.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Wilce.

A historical survey of physical education, beginning with that of ancient Greece, with special emphasis on recent and contemporary developments in Europe and America.

Not open to students who have credit for Physical Education 681.

685. **Prevention and Care of Injuries.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Duffee.

A consideration of the methods of prevention and care of injuries occurring in physical education and competitive sports. The course also includes a discussion of the conditioning of men for athletic contests.

691. **Kinesiology.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Metcalf.

Lectures and recitations dealing with the anatomical mechanism of movements. The purpose of the course is to acquaint the student with means of analyzing move-

† Not given during the academic year, 1932-1933.

ments intelligently and prescribing programs of gymnastics, sports, and dancing for developmental or corrective purposes.

692. Hygiene and School Health Problems. Three credit hours. Spring Quarter. Three lectures each week. Mr. Duffee.

A consideration of the problems in connection with the health of the school child and teacher. Discussions and reports relating to medical inspection, physical examinations, symptoms and control of common school diseases, malnutrition, and the health environment of the school child.

NOTE: For course in the Physiology of Exercise see the Department of Physiology, Course 620.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "860" group except by permission of the Graduate Council.

†801. Seminar in Physical Education and Health. Two credit hours.

In this course each student will work under direction on a special problem. The various problems will be reported on and discussed in class.

Not open to students who have credit for Physical Education 628.

810. Scientific Studies in Physical Education. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, ten hours of physiology and ten hours of psychology. Mr. Hindman.

A survey and evaluation of published researches in the field of physical education, including those in physiology of exercise.

850. Major Research. Three or more credit hours. Autumn, Winter, and Spring Quarters. Mrs. Benedict, Mr. Hindman, and others.

Primarily intended for students working on theses for the Master's degree.

FOR WOMEN

Office, Pomerene Hall

PROFESSOR BENEDICT, ASSISTANT PROFESSORS PALMER, HERSEY, SUMPTION, AND GILMAN, MISS ALWAY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: A fundamental course in physiology in addition to any prerequisites stated in the description of the courses. Course 630 requires also a fundamental course in physical education; 683, a fundamental course in psychology; 691, a course in anatomy; and 692, a course in chemistry.

621. Principles of Physical Education. Five credit hours. Winter Quarter. Prerequisite, ten hours of physiology or equivalent biological training, Physical Education 541-542-543 (Theory and Practice of Physical Education), or equivalent.

The nature of physical education, especially in relation to overlapping fields, such as health education and community recreation, and to education in general. A critical analysis of various objectives advanced; a review, with applications to physical education of modern conceptions of education and of modern principles in psychology and physiology.

625. Tests and Measurements in Physical Education and Health. Three credit hours. Winter Quarter. Three lectures each week. Mr. Hindman.

A critical study of various specific tests and types of tests, including those designed to measure health, organic efficiency and neuromuscular capacity or proficiency. Among the tests studied will be those of Schneider, Brace and Rogers, and a number of efficiency standards in use in public school systems and elsewhere.

† Not given during the academic year, 1932-1933.

626. Supervision of Health and Physical Education. Three credit hours. Winter Quarter. Three lectures each week. Mr. .....

A study of the opportunities and problems of the supervisor in city and county school systems; the relations of the supervisor to the superintendent and to the teacher; rating teachers; methods of assisting teachers.

630. Individual Physical Education. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Physical Education 493. Mr. Metcalf, Miss Gilman.

Making a physical education program meet the needs of handicapped individuals, fundamental principles in the selection and adaptation of activities in corrective procedures, abnormal physical conditions that come to the care or attention of the physical educator, methods of examining and determining individual needs, activity programs of both formal and informal character to meet the needs in schools and colleges will be the problems dealt with in this course. The problems will be discussed in the light of modern objectives of education and particularly individual physical education. There will be lectures, recitations, demonstrations, term projects, and occasional trips to various orthopedic hospitals for observation purposes.

631. Dance Structure (Women). Three to five credit hours. Spring Quarter. Prerequisite, practice in dance technique, Physical Education 550 (Theory and Practice of Physical Education) or the equivalent, and permission of instructor.

Analysis of the dance as an art, principles of structure, form and design, practice in program.

643. Principles of Health Education. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physical Education 692. Miss Palmer.

An interpretation of the meaning of health education and its relation to physical education and to general education.

644. Methods of Health Instruction. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physical Education 643. Miss Palmer.

This course deals with the organization, materials, and methods of instruction in the public schools.

†645. Administration of Physical Education for Administrators and Supervisors. Three credit hours.

A course for high school principals and city superintendents dealing with problems of organization and management of physical education activities.

649. Camping: Its Organization and Administration. Three credit hours. Spring Quarter. Lectures, readings and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is an elective given jointly by the Departments of Physical Education and Sociology. Prerequisite, fundamental courses in sociology and fifteen hours in the Theory and Practice of Physical Education. Mr. Mason, Mr. Metcalf, Miss Alway.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstrations in camping will be included.

This course is the same as Sociology 649.

† Not given during the academic year, 1932-1933.

651. Minor Problems in Physical Education. One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, twenty-five hours in physical education. Before registering, students must secure permission of the instructor. Mrs. Lydia Clark Benedict.

Investigation of minor problems in the field of physical and health education.

682. Organization and Administration of Physical Education. Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Physical Education 683. Mr. St. John, Mrs. Lydia Clark Benedict.

A consideration of the problems of organization for physical education in elementary and secondary schools and colleges, including standards and methods in administration of interscholastic, intercollegiate, and intramural athletics. The first eight lectures will deal with problems common to both men's and women's work. Thereafter, the women's classes will be conducted separately, with emphasis on problems peculiar to this field. The personnel of a department, athletic and gymnastic facilities, and construction, purchase and care of equipment, keeping of records and reports, handling of finances, schedule making, publicity, insignia and awards, managerial systems, scholastic and athletic eligibility, and professionalism, will be included in the problems discussed.

683. History of Physical Education. Three credit hours. Winter Quarter. Three lectures each week. Miss Hersey.

A historical survey of physical education, beginning with that of ancient Greece, with special emphasis on recent and contemporary developments in Europe and America.

Not open to students who have credit for Physical Education 681.

691. Kinesiology. Three credit hours. Autumn Quarter. Two lectures and three laboratory periods each week. Miss Sumption.

Lectures and recitations dealing with the anatomical mechanism of movements. The purpose of the course is to acquaint the student with means of analyzing movements intelligently and prescribing programs of gymnastics, sports, and dancing for developmental or corrective purposes.

692. Hygiene and School Health Problems. Three credit hours. Spring Quarter. Three lectures each week. Mr. Duffee.

A consideration of the problems in connection with the health of the school child and teacher. Discussions and reports relating to medical inspection, physical examinations, symptoms and control of common school diseases, malnutrition, and the health environment of the school child.

NOTE: For course in the Physiology of Exercise see the Department of Physiology, course 620.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

†801. Seminar in Physical Education and Health. Two credit hours.

In this course each student will work under direction on a special problem. The various problems will be reported on and discussed in class.

Not open to students who have credit for Physical Education 628.

810. Scientific Studies in Physical Education. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, ten hours of physiology and ten hours of psychology. Mr. Hindman.

A survey and evaluation of published researches in the field of physical education, including those in physiology of exercise.

† Not given during the academic year, 1932-1933.

850. Major Research. Three or more credit hours. Autumn, Winter, and Spring Quarters. Mrs. Benedict, Mr. Hindman, and others.

Primarily intended for students working on theses for advanced degrees.

PHYSICS

Office, 107 Mendenhall Laboratory

PROFESSORS ALPHEUS W. SMITH, BLAKE, AND LANDE, ASSOCIATE PROFESSORS ALVA W. SMITH AND THOMAS, ASSISTANT PROFESSOR HEIL, MR. ZUMSTEIN, MR. GREEN, MR. KNAUSS, MR. POOL, MR. HESTHAL, MR. NIELSEN, MR. BENNETT, MR. INGLIS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in physics. Courses 607, 608, 609, 610, 611, 612, 620, 621, 622, and 623-624-625, require also an acceptable course in calculus.

Students should consult with the instructor concerning details for prerequisite requirements.

607. Physical Optics. Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Hesthal.

Lenses; systems of lenses; defects of images and their correction; diffraction; interference; polarization; optical rotation; dispersion and anomalous dispersion; optical instruments such as plane grating, concave grating; prism spectroscopes for visible, ultra-violet and infra-red; interferometers; spectrophotometers; and microphotometers.

608. Advanced Electricity. Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Bennett.

An introductory course in the mathematical theory of electricity and magnetism.

609. Molecular Physics and Heat. Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Inglis.

A study of the kinetic theory of gases and related topics.

610. Conduction of Electricity through Gases and Radioactivity. Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Heil.

An introductory course on the passage of electricity through gases and evacuated tubes, ionic velocities, photo-electricity, cathode rays and positive rays, radioactivity, elementary introduction to electron theory of matter, etc.

611. Modern Spectroscopy. Four credit hours. Spring Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Zumstein.

A discussion of recent progress in spectroscopy covering the following topics; series lines in spectra, Ritz principle of combination, Bohr's explanation, neutral and ionized states, ionization potential, types of series, electron orbits, generalization of Bohr's assumption, total and partial quantum numbers, Stark effect, intensity of lines; recent infra-red work; new work in ultra-violet; rest-strahlen, and focal isolation; Zeeman effect; absorption spectra, "raies ultimes."

612. Periodic and Transient Electric Currents. Four credit hours. Spring Quarter. Three lectures and recitations and one two-hour laboratory period each week. Prerequisite, calculus and three Quarters of college physics. Mr. Alva Smith.

Transient and stationary states in electrical circuits containing impulsive or periodic

electromotive forces treated by the methods of differential equations and vector analysis; periodic and aperiodic currents in single circuits with resistance, inductance and capacity in series or parallel; coupled circuits; resonance phenomena; damped oscillations; theory of alternating current bridge measurements; pulsating currents; Fourier's analysis of periodic non-sinusoidal wave forms; electromagnetic radiation.

616. Advanced Physical Laboratory. Three to twenty-four credit hours. All Quarters. Two three-hour laboratory periods each week. Prerequisite, one year of college physics. Mr. Heil.

This course is intended to give the advanced student in science practice in precise physical measurements, involving the use of high grade mechanical, optical, electrical and thermal instruments.

The work undertaken will be elected from the following topics:

(a) **Mechanics and Heat.** Exact measurements involving determinations of elasticities of solids, moments of inertia, torsional rigidity, torsional hysteresis "g" by physical pendulum, coefficient of viscosity, density of gases and vapors, hygrometry, specific heats, heat values of gases, thermoelectromotive forces, etc.

(b) **Advanced Optical Measurements.** Exact determination of indices of refraction by means of spectrometers, wave lengths by means of ruled gratings and interferometers, dispersion, polarization, absorption, analysis of spectra, etc.

(c) **Advanced Electrical Measurements.** Exact measurements of currents, resistances, electromotive forces, magnetic permeability, capacity and inductance; transient phenomena involving the determination of time constants of circuits; fundamental alternating current measurements; the use of the oscillograph in the study of alternating and transient currents.

(d) **Advanced Measurements in Ionization and Radioactivity.** Use of electrometers and electroscopes for exact measurements of currents in gases, saturation currents, discharge of electricity and ionizing properties of radioactive materials, absorption of radiation: ionizing properties of flames and incandescent solids; characteristic curves of two and three electrode tubes and applications, photo-electricity, etc.

(e) **Pyrometry and High Temperature Measurements.** Thermo-electric pyrometers, resistance thermometers, optical pyrometers, total radiation pyrometers, temperature recorders and controlling devices, transition points and thermal analysis at high temperatures.

(f) **Acoustics.** Measurements on characteristics of speech sounds, limits of audition, masking effect of different sounds, binaural beats, acuity of hearing, acoustic filters, reflection and absorption of sound, reverberations, resonance in tubes and pipes, velocity of sound in different media.

Any one of the above topics may be selected during any Quarter with the exception of topic (d), which is offered only during the Winter Quarter.

A student may repeat this course until he has obtained a maximum of twenty-four credit hours. Only three credit hours may be taken during any Quarter except during the Summer Quarter, when six credit hours may be obtained. A student may accumulate not more than six credit hours in any *one* of the above topics.

This course is the same as Physics 602, 603, 604 and 605.

620. X-rays and Crystal Structure. Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Pool.

The production, measurement, and effects of X-rays, including gamma rays; crystal structure and X-ray analysis with applications to chemistry, biology, and metallurgy, the laws of emission, scattering, and absorption and their relation to atomic structure and crystal structure.

621. Acoustics. Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Knauss.

A discussion of wave motion, forced vibrations, origin, propagation, velocity, inter-

ference, diffraction, resonance and energy relations of sound waves, vibration of strings and organ pipes, speech sounds, acoustics of buildings, etc.

622. Thermionics and High Vacuum Phenomena. Four credit hours. Spring Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Heil.

An introductory course in the physical theories of thermionic emission; the discharge of electricity from incandescent solids in gases and high vacua; the effect of space charge and electrode potentials on currents in vacuum tubes; the methods of production and measurement of high vacua; the application of thermionic devices to rectification of alternating currents and to the production and detection of oscillations; use of thermionic devices for measurement of very low pressures; the application of multiple electrode tubes to the study of radiation potentials and ionization potentials.

623-624-625. Introduction to Theoretical Physics. Three credit hours each Quarter. Autumn, Winter, Spring. Three lectures and recitations each week. Prerequisite, calculus, elements of differential equations and three Quarters of college physics. Mr. Thomas.

This course is an introductory mathematical survey of the field of theoretical physics with emphasis on the application of mathematical methods to the solution of physical problems. The content of the course is selected from the following topics: dynamics of a particle, dynamics of rigid and deformable bodies, hydrodynamics of perfect and elastic fluids, dynamical theory of gases, electrostatics and electromagnetics, transient and alternating currents, electromagnetic waves along wires and in free space.

630. Minor Investigations. Three to five credit hours for one or two Quarters. Autumn, Winter, Spring. Prerequisite, nine Quarter-credit hours of Physics 616, or equivalent, and two of the following theoretical courses: Physics 607, 608, 609, 610, 611, 612, or equivalent. All instructors.

After consulting the instructor in charge, the student may select for investigation a subject in radiation, including X-rays, radioactivity, conduction of electricity through gases, radio communication, electricity and magnetism. Opportunity is also offered to repeat certain classical experiments in physics.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 756.

FOR GRADUATES

Prerequisite for Graduate Work: The graduate courses in physics all presuppose a good course in college physics extending over at least a year and including laboratory work. In addition, the theoretical courses have a working knowledge of calculus as a prerequisite and the laboratory courses presuppose a year's work in the laboratory of a more advanced character than that included in the college course in general physics. A fair reading knowledge of German and French is highly desirable.

An undergraduate student shall not be permitted to take any course in the "800" or "900" groups except by permission of the Graduate Council.

801. Electromagnetic Theory of Light. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Physics 607 and 625 or their equivalent.

This course deals with propagation of waves in crystals, circular and elliptic polarization, theory of reflection and refraction, Maxwell's theory, Hertz's verification, boundary conditions, theories of dispersion, optical properties of metals, magneto-optics.

***803. Thermo-dynamics.** Three credit hours. Autumn Quarter. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

This course deals with the fundamental principles of thermo-dynamics and their

* Not given in 1932-1933.

application to such topics as osmotic pressure, electrolytic conduction, diluted and concentrated solutions, the phase rule, chemical equilibrium, metastability of matter, Nernst's heat theorem and the modern theories of specific heats.

*804. **Thermo-dynamics.** Three credit hours. Winter Quarter. Mr. Landé.

A continuation of Physics 803.

*805. **Theory of Electricity and Magnetism.** Three credit hours. Autumn Quarter. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

This course deals with the electromagnetic theory as originally developed by Maxwell. It includes also a consideration of the modern theories of electricity and magnetism. It is essentially a mathematical course.

806. **Theory of Electricity and Magnetism.** Three credit hours. Winter Quarter. Mr. Landé.

A continuation of Physics 805.

809. **General Theory of Small Oscillations.** Three credit hours. Autumn Quarter. Prerequisite, Physics 625 or its equivalent. Mr. Blake.

The general theory of small oscillations will be developed both for free and forced oscillations, with and without damping. The properties of the coefficients of inertia, resistance and elastance will be studied, and illustrated. The properties of normal functions will be studied.

810. **Applications of the Theory of Oscillations.** Three credit hours. Winter Quarter. Prerequisite, Physics 809. Mr. Blake.

The theory of a loaded string and the conditions under which it stimulates a uniform string will be studied and applied to modern telephone engineering. The vibrations of square and circular membranes will be studied and applied.

811. **Applications of the Theory of Oscillations.** Three credit hours. Spring Quarter. Prerequisite, Physics 810. Mr. Blake.

The theory of thermionic oscillators will be developed and applied, electrical and acoustical filters will be studied and some of the theory of transmission networks will be developed.

†813. **Line Spectra and Atomic Structure.** Three credit hours. Autumn Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611 or their equivalents. Mr. Green.

Interpretation of spectral series, stationary states and term values, spinning electrons and fine line structure, vector models of atoms, Zeeman effect and Stark effect, intensity and polarization of spectral lines, Pauli's exclusion principle, hyperfine structure and nuclear moment.

*814. **X-rays in Theory and Practice.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611 or their equivalents. Mr. Blake.

The nature and properties of X-rays will be studied. Comparisons will be made between X- and gamma rays and ultra-violet light as to the laws of reflection, refraction, diffraction, polarization, absorption and scattering. Methods of production of X-rays and their uses in biology and medicine will be presented. The relation of X-rays to crystal and atomic structure will be taken up and the crystal structure of certain crystals will be studied.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

*815. X-rays and Quantum Theory of Atomic Structure. Three credit hours. Spring Quarter. Three lectures and recitations each week. Prerequisite, Physics 814. Mr. Blake.

The determination of the factors affecting the intensity of X-ray emission and absorption lines will be discussed for all the methods of X-ray crystal analysis. Interpretations will be made as to the distribution of the electrons in atoms as determined from the intensity measurements, and comparison will be made between the various methods of studying structure-factors theoretically and experimentally. Interpretations will be made on the fine line structure of absorption bands and the quantum theory of X-rays in studying the structure of atoms will be developed.

817. Quantum and Wave Mechanics. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

Wave mechanics of Schroedinger and deBroglie; matrix mechanics of Born, Heisenberg, and Jordan; relation to classical mechanics; atomic models and spectral lines; band-spectra and vibrations of complex molecules; applications of wave mechanics to the diatomic oscillator-rotator; intensity relations; perturbation theory; degeneracy in spectra; homopolar molecules and nuclear spin; general transformation theory of Dirac and Weyl with deduction of wave equation; applications to emission and absorption; many electron problems; Heisenberg's uncertainty principle.

818. Quantum and Wave Mechanics. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physics 817. Mr. Landé.

Continuation of Physics 817.

819. Quantum and Wave Mechanics. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Physics 818. Mr. Landé.

Continuation of Physics 818.

824. Statistical Mechanics. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physics 625 or its equivalent. Mr. Thomas.

Basis of statistical mechanics and its relation to thermodynamics; vapor pressure; rate of evaporation; fluctuations and Brownian movements; Einstein-Bose statistics; the Pauli-principle and Fermi-Dirac statistics; applications to temperature-radiations; specific heats of gases and crystals; thermionics and the theory of metallic conduction.

825. Applications of Wave Mechanics to Physico-Chemical Phenomena. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physics 824. Mr. Thomas.

Heitler and London's theory of homopolar compounds; dielectric constants and magnetic susceptibilities of gases; paramagnetism of rare earths; Heisenberg's theory of ferromagnetism; collision problems; ionization by radiation and by collision; radioactive processes.

826. Problems in Astrophysics. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Physics 825. Mr. Thomas.

Contributions of theoretical physics to the solution of major problems in astrophysics; emphasis on the application of the quantum theory to stellar phenomena; a discussion of such problems as: thermodynamic methods, radioactive equilibrium, cosmic rays, radiation pressure, statistical mechanics and physical properties of gaseous media, Milne's theory of stellar chromospheres, Eddington's theory of stellar interiors and Jeans' theory of the structure of stars.

* Not given in 1932-1933.

†828. **Philosophy of Physics.** Two credit hours. Prerequisite, acceptable courses in physics, mathematics, and chemistry.

A systematic but non-mathematical survey and philosophical interpretation of recent advances in experimental and theoretical physics and an analysis of the relation of modern physical theories to other fields of knowledge. This series of lectures is open to properly qualified auditors without credit.

†829. **Molecular Structure by X-ray and Cathode Ray Scattering.** Two credit hours. Prerequisite, acceptable courses in physics, mathematics, and chemistry.

This course consists of a series of lectures on molecular physics and chemistry with special reference to molecular structures as revealed by the scattering of X-rays and cathode rays. This series of lectures is open to properly qualified auditors without credit.

851. **Band Spectra and Related Topics.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611.

Classification of molecular spectra; electronic and oscillation bands; Zeeman effect and isotrope effect in band spectra; Raman effect; formation and dissociation of molecules; fluorescence; nature of certain chemical reactions in gases; applications of quantum mechanics to band spectra.

852. **Infra-red Molecular Spectra.** Three credit hours. Spring Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611. Mr. Nielsen.

An interpretation of various types of infra-red bands in terms of vibrating and rotating molecular models; a detailed treatment of symmetric and asymmetric rotators on the basis of both classical and quantum mechanics, intensities of vibration bands and rotation lines; applications of data on infra-red molecular spectra to related chemical and physical phenomena.

†860. **Mathematical Physics.** Three credit hours. Winter Quarter. Prerequisite, Mathematics 832 or its equivalent. Mr. Thomas.

Continuation of treatment of mathematical methods considered in Mathematics 831-832 with special emphasis on the applications of the general principles of mechanics to the fields of hydrodynamics, electrodynamics, elasticity, theory of potential and conduction of heat; solution of particular physical problems by the methods series and singularities.

*861. **Mathematical Physics.** Three credit hours. Spring Quarter. Prerequisite, Physics 860. Mr. Thomas.

Continuation of Physics 860.

900. **Physical Research.** No fixed number of credit hours. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, acceptable courses in physics and mathematics. The student may spend a part or all of his time on his chosen field of research. This course is intended primarily to meet the needs of students who must complete either a thesis or a dissertation as part of the requirements for a degree. Mr. Alpheus W. Smith, Mr. Blake, Mr. Landé, Mr. Alva W. Smith, Mr. Thomas, Mr. Heil, Mr. Green, Mr. Zumstein, Mr. Pool, Mr. Knauss, Mr. Hesthal, Mr. Nielsen, Mr. Bennett, Mr. Inglis.

950. **Research in Astrophysics.** Autumn, Winter, and Spring Quarters. Prerequisite, acceptable courses in physics, mathematics, and

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

astronomy. In accordance with an arrangement made by the Boards of Trustees of The Ohio State University and of Ohio Wesleyan University, students registered in the Graduate School may carry on their research work at the Perkins Observatory of Ohio Wesleyan University under the guidance of the director of the Observatory. Subject of research to be chosen after consultation with the director. This course may be repeated as often as necessary in pursuit of any special research. Mr. Stetson with the cooperation of the staff of the Perkins Observatory.

PHYSIOLOGICAL CHEMISTRY, PHARMACOLOGY, AND MATERIA MEDICA

Office, Hamilton Hall

PROFESSOR SMITH, ASSOCIATE PROFESSOR BROWN, ASSISTANT PROFESSOR WIKOFF

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in general chemistry, qualitative analysis, and organic chemistry in addition to any prerequisites stated in the description of the courses.

Courses 601, 602, and 671 are open only to students doubly registered in the College of Medicine and the Graduate School; courses 631, 632, 633 are open only to students doubly registered in the College of Dentistry and the Graduate School, to the extent of fifteen Quarter-hours.

PHYSIOLOGICAL CHEMISTRY

601. Physiological Chemistry. Five credit hours. Autumn Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, general chemistry, qualitative analysis, and organic chemistry. In addition to these prerequisites a course in quantitative analysis is highly desirable. Mr. Smith, Mr. Brown.

The chemistry of carbohydrates, lipins, and proteins.

602. Physiological Chemistry. Five credit hours. Winter Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, Physiological Chemistry 601. Mr. Smith, Mr. Brown.

The chemistry of digestion, metabolism, and excretion.

611. Physiological Chemistry. Five credit hours. Autumn Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, quantitative analysis, Chemistry 647, 648, 649, 650. Miss Wikoff.

The chemistry of the carbohydrates, lipins, and proteins.

Not open to students who have credit for Physiological Chemistry 601. Not available for graduate credit for students majoring in Physiological Chemistry.

612. Physiological Chemistry. Five credit hours. Winter Quarter. Two lectures, one quiz and six laboratory hours each week. Prerequisite, Physiological Chemistry 611. Miss Wikoff.

The chemistry of digestion, metabolism, and excretion.

Not open to students who have credit for Physiological Chemistry 602. Not available for graduate credit for students majoring in Physiological Chemistry.

613. Quantitative Methods of Blood and Urine Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, Physiological Chemistry 612. Miss Wikoff.

Determination of important constituents of the blood and urine.

Not open to students who have credit for Physiological Chemistry 603.

614. Biochemical Methods of Research. Five credit hours. Autumn Quarter. Two hours of lecture or quiz and nine laboratory hours each week. Prerequisite, Physiological Chemistry 612. Miss Wikoff.

The quantitative analysis of the proteins, fats and carbohydrates. Special methods for the analysis of biological materials.

618. Toxicology. Three credit hours. Autumn Quarter. Two lecture and three laboratory hours each week. Prerequisite, a course in quantitative analysis and Chemistry 647, 648, 649, 650. Mr. Smith.

A course dealing with the effects and detection of poisons.

Not open to students who have credit for Physiological Chemistry 608.

619. Minor Problems in Physiological Chemistry. Two to fifteen credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Physiological Chemistry 612. A student may repeat this course and may spend all or part of his time on it during a Quarter. Mr. Smith, Mr. Brown, Miss Wikoff.

This course is designed to permit any properly qualified person to avail himself of the facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in physiological chemistry. A student may exercise complete freedom in his choice of instructor to direct his work in this course.

631. Physiological Chemistry. Three credit hours. Winter Quarter. One lecture, one quiz, and three laboratory hours each week. Open only to students registered in the College of Dentistry. Prerequisite, general chemistry, qualitative analysis, and organic chemistry. Mr. Brown.

The chemistry of the carbohydrates, lipins and proteins.

632. Physiological Chemistry. Five credit hours. Spring Quarter. Three lecture or quiz hours and six laboratory hours each week. Open only to students registered in the College of Dentistry. Prerequisite, Physiological Chemistry 631. Mr. Brown.

The chemistry of digestion, absorption, metabolism and excretion; the tissues; the internal secretions.

633. Physiological Chemistry. Two credit hours. Autumn Quarter. One lecture and one quiz hour each week. Open only to students registered in the College of Dentistry. Prerequisite, Physiological Chemistry 632. Mr. Brown.

The elements of human nutrition; the effects of diets on the human body; the relation of diets to dentistry.

PHARMACOLOGY

671. Pharmacology. Five credit hours. Spring Quarter. Two lectures, one quiz, and six laboratory hours each week. Open only to students registered in the College of Medicine. Prerequisite, Physiology

604, 605, 606, Physiological Chemistry 602 or 612 and Materia Medica 606 or 670. Mr. Smith.

This course treats of the modification of the normal physiological processes of the body by the presence of the more common drugs used in medicine.

Not open to students who have credit for Pharmacology 605.

675. **Methods of Biologic Drug Assay.** Two credit hours. Spring Quarter. One lecture and three laboratory hours each week. Prerequisite, permission of the instructor. Mr. Smith.

This course includes consideration of the methods in common use for the biological standardization of drugs.

Not open to students who have credit for Pharmacology 607.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" or "900" groups except by permission of the Graduate Council.

PHYSIOLOGICAL CHEMISTRY

*807. **Advanced Physiological Chemistry.** Three credit hours. Spring Quarter. One lecture or quiz and six laboratory hours each week. Prerequisite, Physiological Chemistry 612. Mr. Brown.

An advanced course in biochemical preparations, including the isolation of enzymes, lipins, proteins, and such hormones as epinephrin and insulin.

813. **Seminary in Physiological Chemistry.** Two credit hours. Spring Quarter. Prerequisite, Physiological Chemistry 612. Mr. Brown.

Topic for 1933: The Chemistry of the Fatty Acids.

815. **Biochemical Biography.** One credit hour. Spring Quarter. Prerequisite, Physiological Chemistry 612. Required of all candidates for graduate degrees in physiological chemistry. Miss Wikoff.

830. **Chemistry of Medicinal Substances.** Three credit hours. Winter Quarter. Three conference hours each week. Prerequisite, Physiological Chemistry 611, 612, or Chemistry 841 and 842. Mr. Smith.

901. **Physiological Chemical Research.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, Physiological Chemistry 612. The student may spend a part or all of his time on research work.

PHARMACOLOGY

870. **Research in Materia Medica.** Three to ten credit hours. Autumn, Winter, and Spring Quarters. Hours to be arranged. Mr. Smith, Miss Wikoff.

Problems assigned will have as their objectives either the investigation of plant products of medicinal interest, or the synthesis of chemicals desired for pharmacological study. Close cooperation will be maintained with the pharmacological laboratory.

Not open to students who have credit for Pharmacology 810.

* Not given in 1932-1933.

PHYSIOLOGY

Office, 209 Hamilton Hall

PROFESSORS SEYMOUR, BLEILE (EMERITUS), AND NICE, ASSOCIATE PROFESSOR E. P. DURRANT, ASSISTANT PROFESSORS McPEEK, HITCHCOCK AND HAMLIN, MR R. R. DURANT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in physiology or equivalent biological training, in addition to any prerequisites stated in the description of the courses. Course 622 requires also a course in organic chemistry and 618 a year of general chemistry.

Courses 604 and 605 are open only to students doubly registered in the College of Medicine or the College of Dentistry and the Graduate School, to the extent of fifteen Quarter-hours.

604. Advanced Physiology. Five credit hours. Spring Quarter. Three lecture or recitation hours and six laboratory hours each week. Open only to students registered in the College of Medicine or the College of Dentistry. Mr. Nice, Mr. McPeek, Mr. R. R. Durant, Mr. Hitchcock.

This course deals with the physiology of the contractile tissues, reflexes, lymph, blood, and circulation. The course is based upon animal experimentation by the students, supplemented by demonstrations by the instructors. The bearing of the data obtained upon clinical phenomena is considered.

Not open to students who have credit for Physiology 601 or 615.

605. Advanced Physiology. Six credit hours. Autumn Quarter. Four lecture or recitation hours and six laboratory hours each week. Open only to students registered in the College of Medicine or the College of Dentistry. Mr. Nice, Mr. McPeek, Mr. R. R. Durant, Mr. E. P. Durrant, Mr. Hitchcock.

A continuation of Physiology 604, dealing with respiration, digestion, excretion, metabolism, the central nervous system and sense organs.

Not open to students who have credit for Physiology 602 or 616.

611. Physiological Laboratory. Five credit hours. Autumn Quarter. Two conference and nine laboratory hours each week. Prerequisite, Physiology 615 or 616 or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. E. P. Durrant, Mr. R. R. Durant.

A laboratory course in advanced and specialized physiology of circulation, respiration, neuromuscular phenomena, endocrinology, etc., as the student may elect.

This course should not be elected without previous conference with the instructor in charge.

612. Physiological Laboratory. Five credit hours. Winter Quarter. Two conference and nine laboratory hours each week. Prerequisite, Physiology 615 or 616, or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. E. P. Durrant, Mr. R. R. Durant.

See description under Physiology 611.

This course should not be elected without previous conference with the instructor in charge.

613. Physiological Laboratory. Five credit hours. Spring Quarter. Two conference and nine laboratory hours each week. Prerequi-

site, Physiology 615 or 616, or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. E. P. Durrant, Mr. R. R. Durant.

See description under Physiology 611.

This course should not be elected without previous conference with the instructor in charge.

615. Advanced Physiology. Five credit hours. One Quarter. Autumn and Spring. Four lecture or quiz periods and six laboratory hours each week. Mr. Nice, Mr. McPeek.

This course deals with the physiology of the contractile tissues, reflexes, autonomic nervous system, lymph, blood, and circulation.

Not open to students who have credit for Physiology 601.

616. Advanced Physiology. Five credit hours. Winter Quarter. Four lecture or quiz periods and six laboratory hours each week. Mr. Nice, Mr. McPeek.

A study of respiration, foods, digestion, metabolism, excretion, internal secretions, central nervous system, and special senses.

Not open to students who have credit for Physiology 602.

618. Physiology of Metabolism. Three or five credit hours. Winter Quarter. Three lecture hours or three lecture and six laboratory hours each week. Mr. Hitchcock.

This course deals with both the theoretical and practical aspects of human metabolism as measured by determination of the respiratory exchanges. Some of the more important abnormal variations in the metabolic rate are considered. In the laboratory the student is familiarized with some of the simpler types of apparatus for measuring the metabolic rate.

619. Physiology of Reproduction. Three or five credit hours. Winter Quarter. Three lecture hours or three lecture and six laboratory hours each week. Mr. E. P. Durrant.

This course considers the fundamental phenomena of reproduction in both the simpler and higher forms of living matter. It presents a brief survey of embryonic development and a study of the mammalian gonads with particular emphasis on their hormonal relations. The laboratory work will be devoted to demonstrating the activities of the gonads and the resulting effects upon body processes.

620. Physiology of Exercise. Five credit hours. Spring Quarter. Three lecture hours and six laboratory hours each week. Class limited to twenty students. Mr. Hamlin.

This course deals with present conceptions of muscle physiology, the role of the nervous and endocrine systems in the control of muscular activity, the correlation of circulation, respiration and other body mechanisms with the intensity of muscular exercise, in brief, all those physico-chemical processes which make possible and occur as a result of muscular action.

621. Physiological Technique. Three credit hours. Autumn Quarter. Two conference hours and three laboratory hours each week. Mr. E. P. Durrant.

A course designed to familiarize the student with the technique of mammalian experimentation. Fundamental experiments in circulation. respiration, digestion, and excretion will be presented as a preparation for advanced mammalian physiology.

622. General Physiology. Five credit hours. Winter Quarter. Three lecture or quiz periods and six laboratory hours each week. Mr. Hitchcock.

This course deals with the fundamental physico-chemical principles involved in the

physiological manifestations of life. A study is made of the physico-chemical constitution of living matter, surface tension, diffusion, osmotic pressure, the physiological significance of the colloid state and the part played by electrolytes and ionic concentration in vital phenomena.

Not open to students who have credit for Physiology 406 or 617.

623. General Physiology. Five credit hours. Spring Quarter. Three lecture or quiz and six laboratory hours each week. It is desirable but not essential that this course be preceded by 622. Mr. Hitchcock.

This course is designed primarily as a continuation of Physiology 622 and presents a study of irritability and contractility, together with a brief comparative study of the circulatory, respiratory, secretory, and digestive processes in lower and higher organisms.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

815-816-817. Seminary in Physiology. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in Physiology. All instructors.

900. Physiology Research. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Library, conference. and laboratory work. Prerequisite, fundamental courses (usually biology, chemistry, and physics) necessary to conduct the particular research undertaken. Mr. Nice and staff members.

POLITICAL ECONOMY

(See Economics and Sociology)

POLITICAL SCIENCE

Office, 100 University Hall

PROFESSORS SPENCER, SHEPARD, AND ODEGARD, ASSOCIATE PROFESSOR WALKER, ASSISTANT PROFESSOR HELMS, MR. AUMANN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in political science in addition to any prerequisites stated in the description of the courses.

604. American State Administration. Three credit hours. Spring Quarter. Three meetings each week. Mr. Walker.

The organization of state administration; state activities in relation to taxation, business and professions, education, labor, charities and corrections, militia, health, agriculture, conservation of natural resources, highways.

605. Principles of Public Administration. Five credit hours. Autumn Quarter. Five meetings each week. Mr. Walker.

A consideration of the general problems of public administration; relations between the administration and the other branches of government — executive, legislative, and judicial; the civil service; personnel administration; budgets and accounting; centralized purchasing.

607. Municipal Government. Five credit hours. One Quarter. Autumn and Spring. Five meetings each week. Mr. Helms.

A comparative study of modern municipalities in the United States and the principal countries of Europe; their social significance; their governmental structure; their relation to the state; the experience with government by council, mayor, commission, and manager; methods of popular participation.

608. Municipal Functions. Three credit hours. Winter Quarter. Three meetings each week. Prerequisite, Political Science 607. Mr. Walker.

Municipal administrative organization; staff and line agencies; activities in safety, fire, health, education, recreation, charities, traffic control, pavements, waste disposal, water supply, street lighting, public utilities.

609. Municipal Problems. Three credit hours. Spring Quarter. Three meetings each week. Prerequisite, Political Science 607, 608. Mr. Walker.

Intensive study of one or more key problems of municipal structure or administration.

611. Introduction to Jurisprudence. Five credit hours. Autumn Quarter. Five meetings each week. Mr. Spencer.

An introductory study of legal concepts. An attempt is made both to give the prospective law student an analytical and historical guide into his subject, and to give those who do not intend to pursue the study of law an idea of its significance in social organization, and its relation to political and economic science.

612. International Law. Five credit hours. Winter Quarter. Five meetings each week. Mr. Spencer.

A study of the principles of international law in their growth and present status, with particular attention to unsettled points, and problems raised by the World War.

613. Contemporary International Politics. Five credit hours. Spring Quarter. Five meetings each week. Mr. Spencer.

Methods and ideals of diplomacy; current problems in international relations, such as the reorganization of Europe, Pan-Americanism, and the Far East; tendencies toward administrative, judicial, and legislative world-organization.

615. Administration of Justice. Three credit hours. Spring Quarter. Three meetings each week. Mr. Aumann.

A study of the nature, purposes, and limitations of law as administered through courts. The development, organization, and procedure of our judicial system. Recent trends in legal thinking.

616. American Constitutional Law. Three credit hours. Winter Quarter. Three meetings each week. Mr. Aumann.

A study of leading constitutional principles in the United States as interpreted by the courts. Special studies will be made of such topics as the following: the adoption and amendment of constitutions; the judicial power; citizenship; private rights; the powers of Congress; war powers; police power of the states; political privileges. Designed for students who desire a non-technical knowledge of the more important federal and state constitutional principles in the United States.

617. Administrative Law. Three credit hours. Spring Quarter. Three meetings each week. Prerequisite, Political Science 616. Mr. Odegard.

Administrative organization; procedure of administrative bodies; limits of administrative discretion; quasi-judicial and quasi-legislative powers of administrative bodies; relief against administrative action; conclusiveness of administrative findings. Cases and readings.

621. Ancient and Medieval Political Thought. Three credit hours. Autumn Quarter. Three meetings each week. Mr. Shepard.

The chief theories of European government from the time of Plato to the opening of the modern period. Political Science 621, 622, and 623 are intended to present consecutively the development of European political philosophy.

Not open to students who have credit for Political Science 619.

622. Modern Political Thought. Three credit hours. Winter Quarter. Three meetings each week. Mr. Shepard.

The chief theories of European and American government from the sixteenth century to the middle of the nineteenth century. This course is naturally preceded by Political Science 621, though the latter is not required, and is naturally followed by Political Science 623.

Not open to students who have credit for Political Science 619.

623. Contemporary Political Thought. Three credit hours. Spring Quarter. Three meetings each week. Mr. Shepard.

An examination of the more important contemporary trends of political thought and of the theoretical problems of the nature of the state, of government, and of law.

Not open to students who have credit for Political Science 620.

†625. The British Commonwealth. Three credit hours. Prerequisite, Political Science 401-402.

A critical examination of the governments of the various units of the British Empire with special attention to the self-governing dominions and India. A study of the interrelationships among the members of the empire.

631. Methods of Governmental Research. Three credit hours. Winter Quarter. Three meetings each week. Prerequisite, permission of the instructor. Mr. Walker.

The materials of political science; history of procedure in political science research; research technique; presentation of results of research.

***633. Legislation.** Three credit hours. Spring Quarter. Three meetings each week. Mr. Walker.

The process of law making in the United States, the constituent process, statute law making, legislative drafting, legislative procedure, judicial review, the common law, executive ordinances, popular law making.

634. Public Opinion and Political Processes. Five credit hours. Autumn Quarter. Five meetings each week. Mr. Odegard.

A study of the forces which mould the public mind, and of the channels through which public opinion is expressed, viz., the family, the school, the church, the movies, radio, press, pressure groups and propaganda.

Lectures and discussion.

635. Elections and Parties. Five credit hours. Winter Quarter. Five meetings each week. Mr. Odegard.

A study of voting qualifications, ballot forms, the direct-primary and other forms of nomination, systems of proportional representation, the organization and methods of political parties, and the position and functions of the party system in democracies.

FOR GRADUATES

Prerequisite for Graduate Work: Graduate work in this department presupposes a foundation laid in college courses in the historical and social sciences. As a qualification for the study of political science as a graduate "major," the student must have completed previously the equivalent of six three-hour Quarter-courses, chosen among the subjects of political science, history, and economics. This must include three Quarters' work in political science.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

HISTORICAL CONFERENCE: In addition to the formal courses indicated below, a monthly conference is held, composed of the instructors and graduate students in the

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

departments of History and Political Science. The discussions in this conference cover a wide range of topics of general interest to students and investigators in these fields.

801-802-803. Research in Political Science. Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, six Quarter-courses in political science.

This course presents an opportunity for advanced research in political science, in such portion of the field as may be agreed upon with the individual student. It is offered in every Quarter, and with any of the members of the department in residence.

805. Political Thought. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Shepard.

Research in the history of political ideas and in the theoretical problems of contemporary politics.

806. Comparative Government. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Spencer.

Research in the governments of foreign countries.

Problem for 1932-1933: Parties in European Parliaments.

807. Public Opinion and Political Parties. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Odegard.

A systematic study of the informal phases of politics. Special attention will be given to individual projects dealing with pressure groups, political party organization and procedure, and other aspects of the governmental process.

808. Public Administration. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Walker.

Research in staff and line activities of national, state and local government. Field work, group seminar, individual conference, and written report.

809. Municipal Government. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Helms.

Reading and research in the municipal governments of the United States and Europe.

810. International Relations. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Spencer.

Research in international relations. Problem for 1932-1933: Lessons of the Ten Years' experience with the League of Nations.

811. Public Law. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Aumann.

Readings and research in the field of public law including selected problems in the fields of constitutional law or judicial administration.

POULTRY HUSBANDRY

Poultry Husbandry Building

PROFESSOR DAKAN, ASSISTANT PROFESSOR WINTER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in poultry husbandry in addition to any prerequisites stated in the description of the courses. Course 601 requires a course in agricultural chemistry; 602 requires a course in rural economics.

601. Poultry Nutrition. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Winter.

A study of food nutrients and their metabolism in poultry, compounding rations, feed inspection, and practices of poultry feeding.

602. Poultry Farm and Hatchery Management. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Dakan.

The principles of farm management as applied to the poultry farm. Selection of the farm. Use of poultry farm score card. Farm layout and arrangement of buildings, study of farm records, and advertising. As a final problem each student will work out a plan for the management of a poultry enterprise that seems most adaptable to his personal needs. The course will require several excursions to near-by poultry farms in addition to the recitation periods.

Lectures, recitations and laboratory work upon the problems of the commercial chick hatchery. The organization of a hatchery; egg supply; catalogs; space advertising; service and adjustment of complaints. Hatcheries located in Columbus will be used for laboratory study. This course is designed to prepare students for positions as managers of commercial hatcheries.

603. Marketing Poultry Products. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Dakan.

This course deals with the commercial practices in handling eggs, in poultry crate fattening, killing, and dressing poultry for market, cooperative poultry associations, and the marketing of poultry and eggs.

701. Special Problems in Poultry Husbandry. Three to fifteen credit hours, taken in units of three to five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Mr. Dakan, Mr. Winter.

Limited to advanced students and must be arranged with the professor in charge. Each student will be required to make an exhaustive study of some particular phase of poultry husbandry and write a thesis of his study and research. The work must comprise in part some original investigation by the student.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Poultry Husbandry. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work. Mr. Dakan, Mr. Winter.

Research may be done in genetics, embryology, metabolism, and nutritional diseases.

PRACTICAL ARTS AND VOCATIONAL EDUCATION

Office, 212 Industrial Engineering Building

PROFESSOR STONE, ASSOCIATE PROFESSORS WARNER AND SMITH

There is opportunity in this department for men and women to major or minor in Commercial Education and in Industrial Arts and Vocational Education including Guidance; or to secure preparation in specific phases as outlined below:

I. Teaching and Supervising Practical Arts Education in Elementary Schools: 623, 655

II. Commercial Education

A. Subject matter courses in Accounting, Commercial Geography, Office Practice, Retail Selling, and Journalism (in cooperation with the College of Commerce and Administration)

B. Teaching and Supervising Commercial subjects in the Junior and Senior High School: 660, 663, 665, 667

III. Industrial Arts and Vocational Education

A. Teaching Industrial Arts and Vocational Industrial Education in the Junior or Senior High and Vocational School: 600, 608, 680

B. Laboratory of Industries: 608

C. Special Laboratory or Shop courses in

1. Wood and Cabinet Work

2. Drawing (in cooperation with the Departments of Fine Arts, Engineering Drawing, Architecture, and Civil Engineering)

3. Machine Shop Practice, Foundry, Forging, Sheet Metal Work. and Patternmaking (in cooperation with the Department of Industrial Engineering)

4. Electricity (in cooperation with the Department of Electrical Engineering)

5. Ceramics (in cooperation with the Departments of Fine Arts and Ceramic Engineering)

6. Printing (in cooperation with the Department of Journalism and the University Press)

D. Vocational Continuation Education: 609, 640

IV. Administration and Supervision of Industrial Arts and Vocational Education: 625, 650-651-652

V. Administration and Supervision of Commercial Education: 650-651-652, 665

VI. Project Design in Various Industrial Arts and Vocational Activities

VII. Guidance, Occupational Studies, and Occupational Counseling: 607, 610

VIII. Research in Practical Arts and Vocational Education 800, 801-802-803, 804

NOTE: Provisions are now made (in cooperation with other colleges and departments upon the campus) for advanced work leading to the degrees of Master of Arts and Doctor of Philosophy with a major in Commercial, Industrial Arts, Vocational Industrial Elementary Practical Arts Education and Guidance under general provisions detailed in the Bulletin of the Graduate School.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to the University regulations, courses in this group are not open to Freshmen or Sophomores.

Prerequisite for advanced work in this department: Acceptable courses in the field of education.

600. Introduction to Practical Arts and Vocational Education. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitation periods each week. Mr. Stone, Mr. Warner.

Practical Arts and Vocational Education in the general curriculum. Brief historical résumé, emphasizing present status and trends of practical phases of education as a motivating, activating means to integration and command of fundamentals in the elementary grades; a differentiating, exploratory medium in the junior high school; prevocational and vocational preparation in the senior high and vocational school. Terminology, leaders, principles.

Not open to students who have credit for Industrial Arts Education 600.

607. Occupational Counseling. Three credit hours. Winter Quarter. Two recitations each week. Prerequisite, Practical Arts and Vocational Education 470 (Fundamentals in Guidance). Mr. Smith.

Practical problems connected with occupational guidance and placement. Counseling with pupils, parents, and employers. Survey of guidance materials and of the counselor's technique in the use of these materials. Case studies. Of especial interest to school placement officers, visiting teachers, and coordinators.

Not open to students who have credit for Vocational Education 607.

608. Subject Matter and Method in the Laboratory of Industries. Three credit hours. Autumn Quarter. Three recitation periods each week. Mr. Warner.

Investigations, reports, and discussions involving a scientific approach to the LABORATORY OF INDUSTRIES development. A basic graduate course including topics on: nomenclature, historical development, concepts back of the idea, objectives, "general shop" levels, criterion basis of content selection, physical planning, organization, pupil study, methods, instructional materials technique, testing, and the teacher.

Not open to students who have credit for Industrial Arts Education 608.

†609. **Principles of Part-Time Education.** Two credit hours.

An introductory course consisting of a study of types of part-time education and the aims and purposes of each.

Not open to students who have credit for Vocational Education 602.

610. **Occupational Studies in High and Continuation Schools.** Three credit hours. Spring Quarter. Three recitation periods each week. Enrollment with permission of the instructor. Mr. Stone.

A course designed especially for teachers of occupations in junior and senior high and continuation schools. Attention is given to the development of a technique for gathering, evaluating, and presenting significant occupational data, to the end that youth may become self-reliant in occupational study and choice.

Not open to students who have credit for Industrial Arts Education 610.

†623. **The Teaching and Supervision of Practical Arts in the Elementary School.** Three credit hours. Prerequisite, permission of instructor.

For teachers and supervisors in all phases of elementary education who wish to use practical arts in an activity curriculum. Criteria for selecting and practice in developing different types of activities and projects. Plans of organizing and methods of supervising these activities.

Not open to students who have credit for Industrial Arts Education 623.

625. **Administration of Industrial Arts and Vocational Education.** Three credit hours. Autumn Quarter. Prerequisite, permission of instructor. Mr. Stone.

Relation of Industrial Arts and Vocational Education to the general curriculum and the administrative responsibilities entailed. Courses of study; laboratory and shop provisions in building plans; equipment; relative cost; coordination problems; class and shop organization, and the development of an effective program of supervision. Selection of teachers and their improvement in service.

Not open to students who have credit for School Administration 627 or Industrial Arts Education 625.

†640. **Subject Matter and Method in Vocational Part-Time and Continuation Schools or Classes.** Three credit hours.

Determination of subject matter and method suitable for meeting the needs of continuation school pupils. Detailed study of the coordination and instructional problems peculiar to continuation school work.

Not open to students who have credit for Vocational Education 504-505.

650-651-652. **Minor Problems in Practical Arts and Vocational Education.** One or more credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, twenty-five hours in Practical Arts and Vocational Education, or permission of instructor. Mr. Stone and staff.

This course offers individual students opportunity for intensive study of investigation of specific phases of Practical Arts and Vocational Education. Appropriate topics are found in the curriculum; laboratory or shop equipment; student records; building standards; design; correlation of courses; standards of rating for teachers and students; and other problems of organization, administration, supervision, or instruction.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

† Not given during the academic year, 1932-1933.

†655. **Practical Arts Laboratory for Teachers in Elementary Schools.** Three credit hours. Prerequisite, Practical Arts and Vocational Education 541 (Practical Arts Laboratory for Teachers in Elementary Schools), or permission of instructor.

A continuation of Practical Arts and Vocational Education 541 upon graduate level.

†660. **Principles of Commercial Education.** Three credit hours. Three recitations each week.

For teachers of commercial subjects in the junior or senior high school. Meaning, purpose, and scope of commercial education in secondary schools. Importance of and procedure in making occupational surveys in the field of commercial education.

Not open to students who have credit for Vocational Education 605.

†663. **Subject Matter and Methods in Commercial Education.** Three credit hours. Three recitation periods each week.

Survey and analysis of different commercial occupations and determination of the educational needs of persons in such occupations. Types of commercial curricula and courses of study. Principles of teaching applied to standard commercial subjects.

Not open to students who have credit for Vocational Education 507 and Principles of Education 485.

†665. **Administration and Supervision of Commercial Education.** Three credit hours.

A course designed for administrators and supervisors of commercial education in the junior and senior high school. Courses of study; laboratory facilities; selection and improvement of teachers in service; and other major executive problems.

†667. **Subject Matter and Method in the Laboratory of Commerce.** Three credit hours.

A professionalized subject matter course for teachers of Commercial Arts (sometimes designated also General Business Science or Junior Business Training), typically in junior high and general continuation schools, for major purposes of commercial culture, exploration, and guidance.

680. **Occupational Analysis and Organization of Subject Matter in Industrial Arts and Vocational Industrial Education.** Three credit hours. Winter Quarter. Three recitation periods each week. Mr. Smith.

Principles and practice in defining specific course objectives. Technique of analysis applied to various occupations for the selection of facts and activities conducive to desirable knowledge, skills, and behavior; and the organization of such materials into integrated courses of study. Teaching plans.

Not open to students who have credit for Industrial Arts Education 606 or Vocational Education 502.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

†800. **Research in the Laboratory of Industries.** Three or more credit hours. Conferences and studies using the activities of the Laboratory of Industries as a basis for research. Prerequisite. teaching experience in Industrial Arts or Vocational Industrial Education, and permission of the instructor. Mr. Warner.

Individual or group studies on a combination practicum and laboratory basis with the publication of either a professional or technical bulletin as a goal. Selections to meet the requirements of the group are suggested by: pupil study, diagnosis and achievement;

† Not given during the academic year, 1932-1933.

problems of organizing, supervising, planning, equipping, supplying, and maintaining a Laboratory of Industries; units of content; studies of industry; analysis of method; experimentation.

801-802-803. Scientific Studies in the Practical Arts and Vocational Education. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Stone, Mr. Warner, Mr. Smith.

An extensive view of research techniques applicable to the practical arts and vocational education; critical review and evaluation of published research examples in these fields; recognition and refinement of problems; study of research treatment; methods of writing and presenting research reports.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

804. Major Research Problems in Practical Arts and Vocational Education. Three or more credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Primarily intended for students offering theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

PRINCIPLES AND PRACTICE OF EDUCATION

Office, 116 Education Building

PROFESSORS BODE, TWISS, BRIM, PAHLOW, AND SEELY, ASSOCIATE PROFESSORS LANDSITTEL, ZIRBES, ALBERTY, AND HULLFISH, ASSISTANT PROFESSORS THARP AND MILLER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental course in Principles of Education. Courses 601, 620, 640, 645, 680, 682, 683, and 684 require twenty-five Quarter hours in educational subjects, philosophy, or psychology. Courses 660 and 661 require fundamental courses in physics and chemistry.

Students should consult the instructor for details concerning prerequisites.

Students registered for the Master's degree in the Department of Principles of Education, who contemplate the preparation of a thesis that deals with the teaching of subject matter in the secondary schools shall normally be expected to carry the equivalent of a minor in the subject matter departments. In all such cases the program of the student shall be a matter of a conference between the subject matter department and the student's adviser in the Department of Principles of Education.

601. Moral Ideals in Education. Three credit hours. Autumn Quarter. Mr. Hullfish.

A consideration of types of moral ideals, of the relation of moral values to school subjects, and of the question of direct and systematic moral instruction in the schools.

Not open to students who have credit for Principles of Education 350.

***606. Problems of Junior High School Teaching.** Three credit hours. Winter Quarter. Prerequisite, an elementary course in the principles of education, a course in educational psychology, and five additional hours in educational subjects. Mr. Landsittel.

The reorganization movement in secondary education with special reference to the junior high school. Preservation of essential community of experience. Supervised

* Not given in 1932-1933.

study. The problem-project method of approach. The effect of the exploration objective in the junior high school on habits of study and scholastic attainments.

Not open to students who have credit for Principles of Education 420, 421, 422, 314, 315, 351, or 353.

610. Supervision of Teaching in Secondary Schools. Three credit hours. Spring Quarter. Open to graduate students whose field of specialization is in education; practical teaching experience of at least two years is a further prerequisite. Persons of maturity and experience who have not the prerequisite, may be admitted by permission of the instructor.

The problems involving cooperation between supervisors and teachers. Approved practices in the supervision of classroom work and the evaluation of methods and results.

Not open to students who have credit for Principles of Education 357 or 358.

613. Supervision of Elementary School Teaching. Three credit hours. Winter Quarter. Open to graduate students whose field of specialization is in education. Mr. Price.

The distinctive function of supervision, the problems involved, the requirements for efficiency in supervision, the methods of diagnosis and evaluation of teaching and learning procedure, ways and means of improving instruction, maintaining teacher morale, and stimulating cooperative work.

Not open to students who have credit for Principles of Education 360 or 361.

614. Curriculum Construction in Elementary Education. Three credit hours. Spring Quarter. Open to graduate students whose field of specialization is in education. Mr. Price.

The course is concerned primarily with the revision of elementary curricula in the light of modern educational principles and objectives, the data contributed by research, and the best current practices as found throughout the country.

615. Experimental Elementary Schools. Three credit hours. Autumn Quarter. Open to graduate students whose field of specialization is in education. Mr. Brim.

A study of the attempt to demonstrate and test the different educational theories in elementary schools throughout this country and Europe. These schools will be studied and evaluated in relation to principles.

Not open to students who have credit for Principles of Education 370.

616. Elementary Teacher Training. Four credit hours. Spring Quarter. Open to graduate students whose field of specialization is in education. Mr. Brim.

A study of the function, content and organization of courses of study designed to contribute toward the training of teachers for elementary schools. Standards of organization and training, means of capitalizing subject-matter courses, the interrelations of professional courses, and direction of observation and practice teaching will receive special consideration.

620. Conceptions of Mind in Educational Theory. Three credit hours. Autumn Quarter. Mr. Bode.

A study of the doctrines of mind that have exercised a determining influence upon educational theory and practice.

Not open to students who have credit for Principles of Education 354.

623. Directed Observation of Elementary Teaching. One credit hour. Autumn and Winter Quarters. Six conferences and twelve hours of observation. Open to graduate students whose field of specialization is in education. Persons of maturity and experience who have not this prerequisite may elect the course by permission of the instructor. Miss Zirbes and members of the University Elementary School staff.

This course is offered for teachers, supervisors, principals, and others who wish to study and discuss modern elementary school practice at first hand.

NOTE: For Practical Arts and Vocational Education 623, The Teaching and Supervision of Practical Arts in the Elementary School, three credit hours, see page 206.

624. Practicum in Elementary Education. Two credit hours. Autumn Quarter. Two conferences each week. Participation in special projects and investigations, with reports. Open to principals and teachers in service by permission of the instructor. Miss Zirbes.

The work will center about ways and means of improving instruction through actual attack on selected classroom problems.

625. Problems of Curriculum Construction in Secondary Education. Three credit hours. Autumn Quarter. Open to graduate students whose field of specialization is in education. Persons of maturity and experience who have not the prerequisite may be admitted by permission of the instructor.

A critical survey of the tendencies which have determined the character and content of the secondary school curriculum and an evaluation of present procedures in curriculum construction.

Not open to students who have credit for Principles of Education 362 or 363.

This course is a prerequisite to School Administration 818. Principles of Education 625 should be followed by School Administration 818 by all students preparing for secondary school principalships, and by others interested in the administrative problems of the secondary school curriculum.

***633. Supervision of Student Teaching in Elementary Schools.** Three credit hours. Open to graduate students whose field of specialization is in education.

This course is intended for actual or prospective teachers in teacher training institutions and will deal specifically with the problems of observation, participation and student teaching. Effective means for directing observation, guidance of supervised teaching, and methods of strengthening the young teacher through conferences will be considered.

Not open to students who have credit for Principles of Education 616 or 376.

***634. Professionalized Subject Matter Courses in Teacher Training Institutions.** Three credit hours. Open to graduate students whose field of specialization is in education.

This course is intended for actual or prospective teachers of elementary school subjects in teacher training institutions. A study will be made of the movement to reorganize and enrich methods courses in the normal schools. Consideration will be given to

* Not given in 1932-1933.

the nature and criteria of professionalized subject matter courses and to constructive procedures in planning such courses in the elementary school subjects.

Not open to students who have credit for Principles of Education 616 or 376.

640. Modern Tendencies in Education. Three credit hours. Spring Quarter. Mr. Bode.

A discussion of current doctrines and controversies, in the light of their historic background and their philosophical implications.

Not open to students who have credit for Principles of Education 356.

642. Progressive Trends in Secondary Education. Three credit hours. Winter Quarter. Prerequisite, twenty-five hours in educational subjects, philosophy, or psychology. Mr. Alberty.

A critical study of the principles of the progressive education movement in relation to the general field of secondary school aims, curricula, and procedures.

645. Social Education. Three credit hours. Spring Quarter. Wide readings, papers, lectures, and discussions. Mr. Lumley.

An examination of educational agencies and processes other than those of the school, which contribute to the enlightenment and socialization of the individual. An analysis of childhood's isolation, the methods of communication and control, the influence of the family, the playgrounds, the industrial organization, the church, and the state.

***646. The Teaching of Ideals.** Two credit hours. Mr. Charters.

This course deals with the techniques of character development in the schools. It treats of motivation, habit formation, reasoning, and problem solving, behavior, and the integration of character.

The study of comprehensive collections of published and unpublished material currently used in the schools of the nation will be an integral part of the course.

651. Minor Problems. One to four credit hours. Autumn, Winter, and Spring Quarters. Before registering for this course students must secure the permission of the instructor. Mr. Bode and others.

Investigation of minor problems in the field of principles and practice of education.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

When registering for this course the student should indicate, on the appropriate stub of his class card, the field of his special interest or the name of the professor under whose direction he wishes to work.

†654. Principles and Methods of Teaching the Mentally Retarded. Three credit hours. Prerequisite, Psychology 609 or consent of the instructor.

A critical study of the various methods which are used in teaching the mentally retarded. Opportunity for observation in the demonstration class for mentally retarded children.

***655. Principles and Methods of Teaching Behavior Problem Children.** Three credit hours. Prerequisite, Psychology 609 or the consent of the instructor.

A critical study of principles and methods used in the adjustment of behavior problem children. Opportunity for observation in the demonstration class for behavior problem children.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

656. Supervised Teaching in Special Classes. Five credit hours. Spring Quarter. Prerequisite, Psychology 609, or consent of instructor. Students should consult the instructor before enrolling in this course. Mr. Berry.

Practice teaching for qualified students in classes for the mentally retarded, for behavior problem children, or for the defective in speech.

Students will be expected to devote one-third of their time to this course, under the supervision of the instructor in charge.

660. Problems and Methods of the Natural Sciences. Four credit hours. Autumn Quarter. Prerequisite, a total of twenty hours in physics or chemistry, or twenty hours in physics and chemistry. Mr. Twiss.

Students in the College of Education who are majoring in any of the non-biological sciences must secure credit for four hours of work in Principles of Education 660, 661, 364, 365, 382, 383. These courses are elective for other students in the College of Education, and for students in the other colleges.

This is a course of illustrated lectures, readings, projects, and reports, for the orientation of science teachers—to supply them with a background for their specialized knowledge, and for the selection and organization of subject matter for teaching uses. It consists of historical, biographical, and analytical studies of selected outstanding achievements in typical fields of discovery and invention, their genesis, their development, and their inter-relations with other events and factors of human progress. The events and discoveries considered are selected mostly from the domains of astronomy, physics, astrophysics, and the scientific foundations of public health.

Not open to students who have credit for Principles of Education 364 or 365.

661. Problems and Methods of the Natural Sciences. Four credit hours. Spring Quarter. Prerequisite, twenty hours in physics or chemistry, or twenty hours in physics and chemistry. Mr. Twiss.

This course is a continuation of Principles of Education 660, but is not dependent on it. The events and discoveries considered are selected mostly from the domains of geology, anthropology, chemistry and applied physics.

Not open to students who have credit for Principles of Education 382 or 383.

662. Teaching Literature in the High School. Five credit hours. One Quarter. Autumn and Spring. Five lectures each week. Prerequisite, six Quarters in English and a course in the principles and practice of oral reading. Students who intend to do supervised teaching in English must have Principles of Education 662 (340 and 341) and Principles of Education 714 as prerequisite. Mr. Seely.

Emphasis will fall upon the selection of suitable poetry, drama, prose-fiction, etc., for junior and senior high-school pupils; developing methods for their presentation and study; and suggesting means for correlating the work in literature with the other high school studies.

Not open to students who have credit for Principles of Education 340 or 341.

663. Organizing History for the Classroom. Five credit hours. One Quarter. Autumn and Spring. Open to graduate students whose field of specialization is in the social studies and, with the consent of the

instructor, to other properly qualified students. A prerequisite for those who intend to do supervised teaching in the social studies. Mr. Pahlow.

A professionalized subject-matter course, surveying the field of high school history as a whole and organizing it into smaller units for teaching purposes.

Not open to students who have credit for Principles of Education 384 or 385.

NOTE: See note under Principles of Education 700.

665. Teaching of Social Studies other than History. Three credit hours. Winter Quarter. Open to graduate students whose field of specialization is in any of the social studies and to persons of maturity and experience in teaching with the permission of the instructor. Prerequisite to student teaching in civics, economics, sociology, or geography. Mr. Pahlow.

The aims and methods of teaching geography, civics, economics, and sociology in the junior and senior high school.

666. Problems of High School English Teaching. Three credit hours. Winter Quarter. A course designed for English teachers of experience of those who are now in service.

The content of the course will depend in large part upon the problems which members of the class face in their teaching. Consideration will likely be given to such matters as the English course of study; meeting the individual differences, interests, and capacities of high-school pupils in literature and composition; the articulation of English with the other school subjects, etc.

Not open to students who have credit for Principles of Education 817.

***670. The Rural School Curriculum.** Five credit hours. Spring Quarter.

The fundamental nature of the curriculum problem. The present approved standards for the elementary curriculum. Desirable differentiation in curricula for urban and rural elementary schools. The course will seek to offer concrete and practical help in reorganizing the curriculum in rural elementary schools in terms of rural school conditions and rural children's experience and needs.

Not open to students who have credit for Principles of Education 308, 377, or 513.

680. The Place of the Schools in the Social Organization. Three credit hours. Autumn Quarter. Lectures and discussions.

An examination of the aims and purposes of the school in a democratic society. The bearing of contemporary theories and practice upon educational programs in public school systems. The relation of the school and other community and state agencies of an educational character.

Not open to students who have credit for Principles of Education 380 or 381.

***682. The Educative Process.** Three credit hours. Winter Quarter. Lectures and conferences. Prerequisite, twenty-five hours in educational subjects, philosophy or psychology, including five hours in elementary psychology. These requirements may be modified by special request, in the case of persons of maturity and experience.

A comparative study of contemporary writers and movements in the field of education for the purpose of appraising, developing and formulating their contributions to educational theory and practice.

NOTE: The Department has decided that Principles of Education 683 is the logical

* Not given in 1932-1933.

course to follow Principles of Education 620. Heretofore, 682 has been thought of as the course which should follow 620. This change, therefore, simply means that the prerequisite as withdrawn here is to be added to Principles of Education 683. In view of this change in sequence students should not be held to 620 when registering in the future for 682.

683. The Thinking Process in its Educational Bearings. Three credit hours. Winter Quarter. Lectures and conferences. Prerequisite, Principles of Education 620 or twenty-five hours in educational subjects, philosophy or psychology, including a course in principles of education and a course in psychology. These requirements may be modified by special request, in the case of persons of maturity and experience. Mr. Hullfiish.

A study of the thinking process, for the purpose of tracing its implications for educational theory and classroom practice.

684. The Place of Scientific Method in Education. Three credit hours. Autumn Quarter. Prerequisite, twenty-five hours in educational subjects, philosophy or psychology, including Principles of Education 640 and five hours in elementary psychology, and three Quarters of college science. These requirements may be modified by special request, in the case of persons of maturity and experience. Mr. Brim.

An inquiry into the precise nature and field of scientific method, together with a discussion of the important contributions of the method to educational practices and a consideration of the possible limitations of the application of science to education.

TEACHING COURSES

700. The Teaching of History. Three credit hours. One Quarter. Autumn and Spring. Three meetings each week. Prerequisite or concurrent, four Quarters of history; must be preceded or accompanied by a fifth course. Of these, two should be in medieval and modern European history or in English history, and at least two (preferably three) in American history. Mr. Pahlow.

This course deals with the history of history teaching; aims and methods; classroom and library equipment; evaluation of textbooks; the teaching of current events; the history examination; the history teacher.

NOTE: With the consent of the instructor, students who have had either Principles of Education 663 or 700 may register for supervised teaching in history, provided the other course is taken concurrently with supervised teaching.

705. The Teaching of Biology. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, elementary courses in botany and zoology and at least four additional Quarters of some biological subject. Mr. Sampson (Botany), Mr. David Miller (Zoology).

This course is given primarily for the students in the College of Education who expect to teach high-school biology. The work will include lectures and demonstrations with discussion of the best methods of presenting botany, zoology, and biology to high school students.

714. Teaching Composition in the High School. Five credit hours. One Quarter. Autumn and Spring. Five lectures each week. Prerequisite, six Quarters in English and a course in the principles and practice of oral reading. Required of students who intend to do supervised teaching in English. Mr. Seely.

This course will be devoted to the discussion of the methods of teaching grammar

and composition, and to means of developing originality, imagination, and individuality in the oral and written expression of high school pupils.

Not open to students who have credit for Principles of Education 343.

†716. **The Teaching and Supervision of Journalism in Secondary Schools.** Three credit hours. Four recitations and four hours of laboratory work on the Lantern each week. Mr. Myers.

This course is intended for persons who have been teaching or who expect to teach journalism in secondary schools, or to act as faculty advisers for school newspapers, magazines, or annuals. It includes a general survey of the editorial, business, and mechanical activities of newspaper and magazine publication, with special emphasis on those which are of greatest value and interest to students.

Open only to students registered in the College of Education and graduate students, except by special permission.

717. **The Teaching of Dramatics.** Five credit hours. Autumn Quarter. Open to Seniors by special permision. Mr. Herman Miller.

Lectures on the organization of dramatics courses and the production of plays in high schools.

725. **The Teaching of German.** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, six Quarters of college German or the consent of the instructor. Required of all students who intend to do supervised teaching (Principles of Education 440) in German. Mr. Röseler.

Values. Critical study of objectives and methods. Textbook selection. Classroom procedures. Readings, discussions, and reports.

Not open to students who have credit for German 665.

730. **Methods of Teaching Latin.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Required of all students who intend to do supervised teaching (Principles of Education 440) in Latin. Mr. Hodgman.

Lectures and assigned readings on methods of teaching Latin in the secondary schools. Place and value of Latin in education; bibliography; illustrative exercises in the Latin authors used in high schools.

Not open to students who have credit for Principles of Education 731 or Latin 617.

†731. **The Teaching of Latin.** Three credit hours. Prerequisite, six Quarters of college Latin, or the consent of the instructor. Mr. Hough.

A general course based primarily upon the authors read in the secondary schools. Selections from each will be studied in detail to afford practice in the fundamentals of grammar, in the art of expression, and the arts of translation and interpretation. Topics directly concerned with the work of the classroom will be discussed, such as the ends of the study, the methods best adapted to attain them, the place and purpose of prose composition, the use of translation, illustrative material.

Not open to students who have credit for Principles of Education 730 or Latin 617. It may be counted as part of a major or minor in Latin.

735. **The Teaching of Mathematics.** Three credit hours. Autumn Quarter. Three recitations each week. Lectures and discussions. Prerequisite or concurrent, calculus, or experience in teaching secondary mathematics. Mr. Twiss.

† Not given during the academic year, 1932-1933.

The educational value of the study of mathematics; the content matter of the various courses in the junior and senior high schools; modes and methods; recent and contemporary studies of the teaching of mathematics.

Not open to students who have credit for Mathematics 681.

740. The Teaching of French. Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Prerequisite or concurrent, six Quarters of college French. Required of all students who intend to do supervised teaching in French. Mr. Tharp.

Values. Teacher's equipment. Objectives and methods. Textbook selection. Classroom procedures. Readings, discussions and conferences.

Not open to students taking Principles of Education 745. This course cannot be used for credit towards an advanced degree with a major in French.

745. The Teaching of Spanish. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite or concurrent, six Quarters of college Spanish. Required of all students who intend to do supervised teaching in Spanish. Mr. Tharp.

Values. Teacher's equipment. Objectives and methods. Textbook selection. Classroom procedures. Readings, discussions, and conferences.

Not open to students taking Principles of Education 740.

750. The Teaching of Mechanical Drawing. Three credit hours. Autumn Quarter. One lecture and two three-hour laboratory periods each week. Mr. French.

Not open to students who have credit for Engineering Drawing 431 or 531.

751. The Teaching of Mechanical Drawing. Three credit hours. Winter Quarter. One lecture and two three-hour laboratory periods each week. Prerequisite, Principles of Education 750. Mr. French.

Not open to students who have credit for Engineering Drawing 432 or 532.

756. The Teaching of Chemistry and Physics. Three credit hours. Spring Quarter. Three meetings each week. Lectures, recitations, readings, and projects. Prerequisite, acceptable courses in general, analytical, and organic chemistry and two Quarters work in college physics, or an approximate equivalent with more of physics and less of chemistry. Mr. Twiss.

A study of the problems of instruction that confront the teacher of chemistry and physics in modern high schools, such as objectives, educational values and methods of chemistry and physics teaching, selection and organization of subject matter, choice and use of textbooks, apparatus, recitations, lectures, excursions, class and laboratory experiments, problems and projects, reviews, tests, etc.

Students enrolling in this course are advised to bring with them chemistry and physics textbooks and apparatus catalogs of recent publication.

Not open to students who have credit for Principles of Education 710 or 755.

760. Spoken English: Teachers' Course. Three credit hours. Winter Quarter. Open only to teachers or prospective teachers. Mr. Wiley.

Classroom lectures and discussion designed to assist teachers of public speaking and debating in secondary schools. The nature of speech training in the secondary schools. Definite suggestions on the following: how to prepare students for debating and

speaking contests; speech composition and delivery; classroom reports. This is not a course in speech practice.

Not open to students who have credit for Public Speaking 680.

770. The Teaching of Nursing. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, three years of training in an accredited school of nursing or Senior standing in the College of Education with major in nursing, physical education, home economics, or biological sciences. Miss Johnson.

Selection and arrangement of subject matter used in schools of nursing, planning lessons and demonstrations, equipment for classroom, and other teaching equipment recommended by the State Medical Board.

Not open to students who have credit for Science Nursing 653.

NOTE: For teaching courses in Physical Education see the Department of Physical Education.

For teaching course in Practical Arts Education see Practical Arts and Vocational Education 623, page 206.

For the teaching course in Commercial Education see Practical Arts and Vocational Education 663, page 207.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

The courses in this department fall into four general groups. The suggested sequences listed below are offered for the guidance of students desiring a consistent program giving preparation in one of these fields. It is suggested, however, that students contemplating such work consult with the department before undertaking the sequence offering in any one of these fields. Graduate students who are candidates for the Master's degree in this department and who anticipate the preparation of a thesis that bears upon the teaching of subject-matter in the secondary schools are expected to carry 15 Quarter-hours in that subject-matter field.

Recommended Sequences of Courses:

I. General Theory

(a) 620, 683, 640, 682, 684; (b) 620, 601, 640, 680, 645

It may be desirable, in the case of special interests, to select from both sequences. Graduate students majoring in this field should consult the department about registration in the seminars (801-802-803-804) offered in general theory.

II. Principles and Practice of Elementary Education

(a) Supervisors and Principals of Elementary Schools
620, 683, 640, 612, 613, 614, 615, 623, 840

(b) Elementary Teacher Training
620, 683, 640, 616, 633, 634, 840

Graduate students majoring in this field should consult the department about registration in the seminars (824-825-826-827) offered in Principles and Practice of Elementary Education.

III. Principles and Practice of Secondary Education
620, 683, 640, 610, 625, 642, 680

Graduate students majoring in this field should consult the department about registration in the seminars (810-811-812-813) offered in Principles and Practice of Secondary Education; those students training for high-school principalships are expected to take School Administration 818.

IV. Principles and Practice of Higher Education
620, 683, 640, 819, 823, 860, School Administration 801, 840 or 843.

802-*803-804. Special Problems in Educational Theory. Three credit hours. Autumn and Spring Quarters. Mr. Bode.

* Not given in 1932-1933.

811-812-813. Special Problems in Secondary Education. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Alberty.

***814-*815-816. Special Educational Problems in the Social Studies in the Secondary Schools.** Three credit hours. Spring Quarter. Mr. Pahlow.

818. Seminar in Curriculum Construction. Three credit hours. Autumn Quarter. Open by permission of the instructor. Mr. Dale.

Advanced study of techniques for developing reading materials to insure desirable grade placement, for the preparation of teaching materials for radio or motion picture presentation, for the placement of units of work in various school subjects, for analyzing and developing professional curricula in colleges, and other techniques in which advanced students may be interested.

819. The College Curriculum. Three credit hours. Winter Quarter. Prerequisite, Principles of Education 823 or permission of the instructor. Mr. Hullfish.

A critical study of present procedures in curriculum-making, with special reference to logical and psychological organization of subject matter, activity analysis, survey and orientation courses, and the integration of courses with reference to social outlook. Especial consideration will be given the Junior College movement.

821-822. Special Educational Problems in the Physical Sciences in the Secondary Schools. Three credit hours. Autumn and Spring Quarters. Mr. Twiss.

Individual studies in the history, methods, problems, influence, scope, and future development of the physical sciences, their place in a modern educational philosophy, and their educational values and functions in the curriculum. It is adapted to the needs of students specializing in principles of education or in any of the physical sciences.

823. Theories of Higher Education. Three credit hours. Autumn Quarter. Open on permission of the instructor. Mr. Hullfish.

A study of the basic theories current in higher education, with special reference to the ideals of culture, of scholarship, and of social efficiency.

825-*826-827. Special Problems in Elementary Education. Three credit hours. Autumn and Spring Quarters. Miss Zirbes, Mr. Brim.

828. Studies in Elementary Education. Three credit hours. Spring Quarter. Open to graduate students whose field of specialization is in education. Miss Zirbes.

This course will survey and evaluate published researches in this field for the purpose of noting the contributions of research to the changing points of view and practices of elementary education and of developing a background for the attack on unsolved problems.

Not open to students who have credit for Principles of Education 374 or 612.

†835. The Teaching and Supervision of History in the Secondary Schools. Three credit hours. Three lectures each week. Prerequisite, Principles of Education 700 or 720. Mr. Pahlow.

A course designed for supervisors, heads of departments, and experienced teachers dealing with the place of history in American and European secondary schools, special

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

attention being paid to recent innovations and tendencies in the content and method of the history course.

Not open to students who have credit for Principles of Education 366, 367, or 703.

840. Problems in the Practice of Elementary Supervision. Three credit hours. Spring Quarter. Prerequisite, Principles of Education 613. Miss Zirbes.

Typical field problems will be used as a basis for training students in the techniques of supervisory service. Emphasis will be placed primarily on the application of principles of supervision to actual classroom situations.

†843. The Teaching and Supervision of English in the Secondary Schools. Three credit hours. Lectures and discussions. Prerequisite, Principles of Education 662 (or 340 and 341), or permission of the instructor. Persons of maturity and experience who have not the prerequisite may elect the course by permission of the instructor. Mr. Seely.

An analysis of contemporary movements in the reorganization of methods and materials in secondary-school English. Opportunity will be afforded for the solution of individual problems with which members of the class are confronted in their present teaching activities.

Not open to students who have credit for Principles of Education 368.

***844. The Teaching and Supervision of English in the Secondary Schools.** Three credit hours. Lectures and discussions. Prerequisite, Principles of Education 714, or permission of the instructor. Persons of maturity and experience who have not the prerequisite may elect the course by permission of the instructor.

A continuation of Principles of Education 843.

Not open to students who have credit for Principles of Education 369.

846. The Teaching of Modern Foreign Languages in Secondary Schools. Three credit hours. Spring Quarter. Readings, discussions, and conferences. Prerequisite, an elementary course in principles of Education 725, 740, or 745, or one year's successful experience as a modern language teacher, or consent of the instructor. Mr. Tharp.

A critical survey of recent tendencies in modern language instruction in the high school in the light of the Publications of the Modern Foreign Language Study.

***847. Special Problems in the Teaching and Supervision of Modern Foreign Languages in the Secondary Schools.** Three credit hours. Spring Quarter. Lectures, readings, investigation, and conferences. Prerequisite, Principles of Education 846; and Psychology 608 or its equivalent. Mr. Tharp.

This course is designed for supervisors and heads of departments of modern languages. A study of standards of achievement and evaluation of teaching. Problems in investigation in modern languages.

848. Special Problems in the Teaching and Supervision of the Foreign Languages in the Secondary Schools. Three credit hours. Autumn Quarter. Prerequisite, six Quarters of college instruction in a foreign language; one of the following courses in Principles of Education: 725,

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

730, 740, 745, or one year's successful experience as a foreign language teacher; and consent of the instructor. Mr. Tharp.

The problem for study during this Quarter is: The Techniques of the Teaching of Reading Foreign Languages.

A survey of the literature dealing with the psychological principles of vernacular reading; methods of acquiring vocabulary, the influence of oral-aural activities and the techniques of reading instruction.

851. Major Research. Three or more credit hours. Autumn, Winter, and Spring Quarters. Mr. Bode and others.

Primarily intended for students offering theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

860. College Teaching. Three credit hours. Winter Quarter. Prerequisite, Principles of Education 823, or permission of the instructor. Mr. Hullfish.

A discussion of classroom procedures in the light of underlying assumptions regarding educational outcomes and the nature of learning. The lecture, the recitation, honors courses, examinations, and recent experimental procedures will be considered.

861. Techniques of Curriculum Construction. Five credit hours. Autumn Quarter. Open to students who have completed one year of graduate work in education. Mr. Charters.

This course deals with those techniques of curriculum construction which are used in the assembling of raw materials for the curriculum; the techniques for the determination of objectives; activity, trait, and difficulty analysis; the evaluation of activities; sampling, interviewing; and other techniques connected with the collection of raw material.

PROSTHESIS

Office, Hamilton Hall

PROFESSOR COTTRELL, ASSISTANT PROFESSORS WILTBERGER AND KITCHIN, MR. STARR

FOR ADVANCED UNDERGRADUATES AND GRADUATES

704-705-706. Minor Problems in Prosthesis. One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, adequate preparation in technical courses concerned. Mr. Cottrell, Mr. Wiltberger, Mr. Kitchin, Mr. Starr.

Students will have assigned to them special problems in Prosthesis.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

804-805-806. Research in Prosthesis. Autumn, Winter, and Spring Quarters. Prerequisite, adequate preparation in technical and practical courses in prosthesis. Mr. Cottrell, Mr. Wiltberger, Mr. Kitchin, Mr. Starr.

Research relating to and found in the various endeavors concerning the restoration of the mouth to normal conditions through substitutions for lost parts.

PSYCHOLOGY

Office, 325 Education Building

PROFESSORS ARPS, BURTT, GODDARD, MAXFIELD, PRESSEY, TOOPS, DOCKERAY, RENSHAW, AND ENGLISH, ASSOCIATE PROFESSOR WILLIAMS, ASSISTANT PROFESSORS ROGERS, L. C. PRESSEY, DUREA, AND EDGERTON, MRS. STOGDILL

The courses offered in psychology fall into four general groups. The following approximate sequences are suggested for the guidance of students desiring a consistent program giving preparation in one of these fields. It is strongly urged, however, that students contemplating such work consult with the department as early as possible with reference to the arrangement of courses. This is particularly the case with graduate students. Thus in planning for a Doctor's degree a reading knowledge of French and German should be acquired during the undergraduate period.

I. General, Experimental, and Comparative Psychology: 601-602-603, 607, 608, 621, 626, 629, 630, 645, 646, 647, 650, 655, 656, 657, 658.

II. Educational Psychology—preparation for psychological service to the schools: 608, 610, 662, 613, 614, 615, 616, 611, 628, 652, 650, 663, 676.

III. Abnormal and Clinical Psychology: 605, 606, 609, 611, 616, 617, 618, 619, 620, 621, 622, 631, 641, 642, 650, 661, 801, 806, 808.

In this division will be found courses serving the following purposes:

(1) Extending the student's knowledge of another field of psychology.

(2) Acquainting the student with an understanding of the possible derangements or disturbances of mental functions, and the means for correcting these in himself or in others.

(3) Fitting the student for service in one of the rapidly developing fields of mental hygiene as psycho-clinician, teacher, or director of clinics.

(4) A service clinic for the students of the University. Women may consult Mrs. Emily Leatherman Stogdill; men, Mr. M. A. Durea. Room 303, Education Building.

IV. Industrial Psychology: 635, 636, 608, 639, 637, 638, 650.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in psychology in addition to any prerequisites stated in the description of the courses. Course 624 requires a fundamental course in physics.

601. Experimental Psychology. Three credit hours. Autumn Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

The laboratory training course in experimental psychology for advanced undergraduate and graduate students. The experiments are selected both for general cultural value and for preparation for technical research in experimental psychology.

Courses 601, 602, 603 comprise a unit year's work. In special cases students may enter course 602 without having credit for 601.

602. Experimental Psychology. Three credit hours. Winter Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

603. Experimental Psychology. Three credit hours. Spring Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

605. Physiological Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Goddard.

The aim of this course is to give a consistent picture of the physical basis of mind. It uses the important facts of the anatomy and physiology of the central and autonomic nervous systems and the more generally accepted theories of nerve functions and their correlations with mental processes.

606. Advanced Physiological Psychology. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Psychology 605 or permission of the instructor. Mr. Goddard.

This course will deal with the larger problems of the dependence of mental phenomena upon physiological processes such as: the emotions and the sympathetic system; temperament and the endocrines; consciousness and the circulation; nerve activity without consciousness; effect of unusual physiological conditions (e. g., produced by fatigue, alcohol, syphilis or other toxins) upon various mental processes.

607. Genetic Psychology. Five credit hours. Spring Quarter. Five lecture hours each week. Lectures, recitations, and report. Mr. Williams.

This course is designed to present the facts of mental development and their significance. Topics considered are: individual development, particularly with reference to the development of the nervous system; inheritance of mental traits; innate tendencies, their characteristics, description, and modification; play; mental states, their physiological basis and development with growth and training; moral and religious development; physical development; methods of child study; exceptional children (observation of atypical children in city and state institutions).

608. Educational Statistics: Elementary. Four credit hours. Autumn Quarter. Two lectures and two two-hour laboratory periods each week. Mr. Toops, Mr. Edgerton.

A basic statistical course for students intending to conduct major or minor research. Frequency distributions, methods of measuring central tendencies and variability; construction of graphs and charts; interpretation of results in terms of probability; simple treatment of correlation. Extended practice in the use of calculating machines and computational devices.

Not open to students who have credit for School Administration 613 or 643.

609. The Exceptional Child. Three credit hours. One Quarter. Winter and Spring. Three lecture hours each week. Lectures, reports, clinics, and visits to public institutions. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield, Mr. Berry.

Individual differences among children with respect to mental, physical, and social traits. The social and pedagogical significance of talent and defect. Consideration of gifted children, special abilities and disabilities, blindness, deafness, speech defect, mental retardation, and behavior problems. Emphasis will be placed on the psychology of the exceptional child as a foundation for educational classification and treatment.

610. Adolescence. Three credit hours. Autumn Quarter. Three lectures each week. Mr. English.

A study of the outstanding characteristics of the adolescent boy and girl, the educational and social problems arising at this period, and means for dealing with these problems.

611. The Mentally Deficient Child. Three credit hours. Autumn Quarter. Three lecture hours each week. Lectures, reports, clinics, and visits to public institutions. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield.

The varieties and grades of mental deficiency, including the backward child of the schools and the distinctly feeble-minded. Consideration of mental deficiency and defect for purposes of educational treatment and social disposition. The psychology of feeblemindedness; types, degrees, causes, and consequences. Minor consideration of the special pedagogy of backward children.

612. Educational Statistics: Intermediate. Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Psychology 608 or School Administration 643 or equivalent. Mr. Toops.

Fuller treatment of correlation: regression coefficients and equations; partial and multiple correlation; uses of normal probability curve; reliability and validity of test data; comparable measures.

Not open to students who have credit for School Administration 644.

613. Mental and Educational Tests. Three credit hours. Winter Quarter. Two lecture hours and one conference each week. Lectures, readings, classroom demonstrations, and special reports. Mr. Pressey.

A brief course covering the use of tests of both ability and school work. The course will begin with a discussion of tests in arithmetic, reading and history, and other school subjects, will then take up tests of intelligence and will conclude with a general discussion of the handling of test scores and of the use to be made of these scores in dealing with practical problems.

†614. Problems of Test Work. Three credit hours. One Quarter. Three lectures each week. Lectures, readings in educational periodicals, discussion. Prerequisite, Psychology 613 or its equivalent. Mr. Pressey.

Reliability and validity of tests. Interpretation of scores. Statement of results; graphing. Criteria for selecting tests; organization of test work; records; application of test results in dealing with educational problems. Tests of the emotions and of other special types. The work will be illustrated throughout by use of standard mental and educational tests. Students having data of their own are urged to make use of this material.

615. Laboratory in Tests and Educational Diagnosis. Three credit hours. Spring Quarter. Six laboratory hours each week. Prerequisite, Psychology 613 or permission of the instructor. Mr. Pressey.

Practice in the giving and scoring of tests and in the use of tests in dealing with educational problems. Special attention will be given to use of test materials in the diagnosis of special disabilities and difficulties in school work.

616. Individual Testing by the Binet-Simon Method. Two credit hours. One Quarter. Autumn and Winter. Two laboratory periods each week. Reports, laboratory demonstrations, and individual testing. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield, Mr. Durea.

Practice on the technique of the Stanford revision of the Binet-Simon scale for measuring intelligence. Brief historical and descriptive treatment of the Binet scale, followed by intensive training in its practical use.

617. Advanced Binet Testing. Two credit hours. One Quarter. Winter and Spring. Two laboratory periods each week. Reports, laboratory demonstrations, and individual testing. Prerequisite or concurrent, Psychology 616. Mr. Maxfield, Mr. Durea.

Advanced study and application of the Binet-Simon method. Review of revisions of the Binet-Simon scale. Intensive training in the practical use of the revision by Kuhlmann, Herring, and Hayes.

618. Clinical Tests. Two credit hours. One Quarter. Autumn and Spring. Two laboratory periods each week. Laboratory demonstrations

† Not given during the academic year, 1932-1933.

and individual testing. Prerequisite, fifteen hours of psychology. Mr. Maxfield, Mr. Durea.

Descriptive and practical laboratory study of standard diagnostic tests and techniques, particularly those known as performance tests.

619. Psychological Clinic. Two or four credit hours. One Quarter. Autumn, Winter, Spring. One four-hour laboratory period each week. Clinic practicum. Individual case studies, reports, case conferences, home visits, and clinical procedure. May be taken for one or two Quarters with a maximum credit of four hours. Prerequisite, Psychology 616 and 618; prerequisite or concurrent, Psychology 617 or permission of the instructor. Mr. Goddard, Mr. Maxfield.

Theory and practice of clinical case study, including family history, personal history, school history, and social history. Interpretation of reports of medical examiners, teachers, social agencies, etc., as well as interpretation of test results. Participation in the regular work of the Psychological Clinic conducted by the Department of Psychology. Training in the preparation of clinical reports.

NOTE: A student may profitably receive the special training which this course gives for a second Quarter. Repetition does not involve repetition of content but additional practice in clinical procedure.

620. Advanced Psychological Clinic. Two credit hours. One Quarter. Autumn, Winter, Spring. Assignments equivalent to two laboratory periods each week. Prerequisite, Psychology 619 or permission of the instructor (students are advised to consult instructor before registering). May be taken for one or two Quarters with a maximum credit of four hours. Mr. Goddard, Mr. Maxfield, Mrs. Stogdill.

Students will engage in actual clinical service, under the supervision of the instructor. Cases will be studied in the laboratory and in the nearby public schools and institutions. Special training in the diagnosis of borderline, psychopathic and doubtful cases. Case studies involving psycho-educational or behavior problems. Follow-up work on cases previously studied in the clinic. Problems of educational and vocational guidance. Advanced training in the preparation of clinical reports. Students expecting to deal with problems of college personnel will be assigned to work in this field.

NOTE: A student may profitably receive the special training which this course gives for a second Quarter. Repetition does not involve repetition of content but additional practice in clinical procedure.

621. Social Psychology. Three credit hours. Winter Quarter. Three lecture hours each week. Mr. Arps.

The nature and variety of innate tendencies; the relation of these tendencies to acquired behavior and social control; the development of personality.

622. The Psychology of the Delinquent Child. Three credit hours. Winter Quarter. Three lecture hours each week. Lectures, reports, and visits to the Bureau of Juvenile Research. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield.

The meaning and significance of delinquency; its psychological basis; causes and prevention; the home and school as factors determining delinquent behavior; the significance of psychological findings for juvenile court procedure; present day methods of dealing with the problem.

624. Psychology of Vision and Hearing. Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Psychology 602. Mr. Williams.

Production, measurement and control of photic stimuli and measurements of the

variations in their effectiveness as determined by physical and physiological factors. The work will consist in part of lecture-demonstrations and experiments and in part of a critical study of the reports of original authors. Special attention will be given to the facts and hypotheses of color-vision and to visual problems in industry.

626. Problems in Learning and Thinking. Three credit hours. Winter Quarter. Three lecture and discussion hours each week. Mr. Renshaw.

The development of the principles which underlie the acquired modifications of human behavior, from associationism to the present time.

628. The Learning Process. Three credit hours. Autumn Quarter. Three lectures each week. Lectures, readings in monographs and journals, discussions. Mr. English.

An advanced course in educational psychology, dealing with certain especially important problems in the field, such as the control of the learning process, memory and forgetting, transfer of training, fatigue, with emphasis upon the more elaborate types of learning such as are seen in school work. Especial attention will be paid to recent experimentation and theories concerning the learning process.

629. Advanced Psychology. Five credit hours. Autumn Quarter. Five lectures each week. Miss Rogers.

The purpose of this course is to give a larger background to the advanced student of psychology, with respect to other disciplines, especially the sciences, leading to a systematic development of structuralistic psychology.

630. Psychology of Feeling and Emotion. Five credit hours. Winter Quarter. Five lectures each week. Miss Rogers.

A study of the various theories of feeling and emotion and the fundamental relations of emotion to instinct. Emotions in relation to various physiological activities. Methods of investigating emotion.

***631. Theory of Intelligence.** Three credit hours. Spring Quarter. Three lecture hours each week. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects. Mr. English.

Nature of intelligence, current and historical concepts. Psychology of intelligence; physical and physiological correlates. Distribution and growth of intelligence. Critical study of the intelligence quotient, mental age, mental level, mental type, mental function.

634. Criminal and Legal Psychology. Five credit hours. Winter Quarter. Five lectures each week. Mr. Burtt.

Psychological factors in the determination of reliability of testimony; the technique of detecting crime and falsehood; responsibility; the relation of crime to mental disease or defect; the prevention of crime through environmental factors and heredity.

635. Psychology of Advertising. Three credit hours. One Quarter. Autumn and Spring. Three lectures each week. Mr. Burtt.

The psychological principles involved in effective advertising, notably attention, memory and action, with the contributory factors of association, feeling, instinct, suggestion, and reasoning.

636. Advertising Psychology Laboratory. Three credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite, Psychology 635. Mr. Burtt.

General and special problems illustrating the application of laboratory methods and the treatment and use of experimental data in the field of advertising psychology.

* Not given in 1932-1933.

637. Industrial Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Burtt.

The application of psychology to problems of industrial learning, adjustment of technical to mental factors, monotony, fatigue, environmental conditions, industrial unrest and morale.

638. Industrial and Vocational Psychology Laboratory. Three credit hours. Spring Quarter. Two three-hour laboratory periods each week. Prerequisite, permission of the instructor. Mr. Burtt.

Laboratory work in the application of psychology to industrial and vocational problems, with especial emphasis on the development of psychological techniques for hiring employees. Practice in the devising and standardizing of occupational tests; obtaining and evaluating production ratings; correlation of ratings and tests; interpretation of results from the standpoint of vocational selection or guidance. A portion of the work of the course is frequently done in local business and industrial plants.

639. Psychology and Personnel. Three credit hours. Winter Quarter. Three lectures each week. Mr. Burtt.

The application of psychology to problems of personnel. Selection and placement of employees by tests of intelligence and special ability. Trade tests, job analysis, and rating scales.

640. Educational and Vocational Guidance. Three credit hours. Winter Quarter. Mr. Edgerton.

A course dealing with the technique of evaluating psychological and related factors as a basis for making educational and vocational recommendations to individuals. The place of vocational and educational tests, previous record, and personality traits in determination of choice of occupation or course of study.

Not open to students who have credit for Psychology 417.

641. Abnormal Psychology. Five credit hours. Winter Quarter. Five lectures each week. Lectures, recitations, and clinics. Mr. Goddard.

The abnormal mental phenomena—viz., disorders of perception, association, memory, affection, judgment, action, volition, and personality, with especial emphasis on their relation to the respective normal phenomena. The grouping of these disorders into the syndromes exhibited in the main types of insanity.

***642. Psychopathology.** Three credit hours. Spring Quarter. Three lectures each week. Lectures, recitations, and reports. Mr. Goddard.

This course deals with the unusual (so-called pathological) manifestations of mind. Beginning with a consideration of subconscious phenomena—sleep, dreams, hypnosis, automatic writing, etc., there will be discussed: phobias, suggestion, the psychological aspects of hysteria, and multiple personality, psychasthenia, neurasthenia, and other disorders of personality.

644. Human Motives and Incentives. Three credit hours. Winter Quarter. Three hours each week. Lectures, recitations, and assigned readings. Mr. Toops.

The psychological bases of initiation and improvement of work. The role of instinct, habit, custom, and tradition, rationalization and psychopathy in motivation. The incentive values of self-ratings, competition, punishment, and such rewards as money, bonuses, participation, and promotion, in relation to the capacities of individuals.

645. History of Psychology. Five credit hours. Autumn Quarter. Five lectures each week. Prerequisite, sixteen hours in psychology. Mr. Williams.

The course aims to view modern psychological problems in the light of their historical antecedents. The development of various theories such as those of sensation,

* Not given in 1932-1933.

attention, space perception, and emotion will be traced from earliest times to the present. As far as possible assignments will involve reference to original sources.

646. Principles of Human Behavior. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, sixteen hours in psychology. Mr. Dockeray.

A study of the development of theories of human behavior and a consideration of the simplest assumptions necessary and sufficient to explain the facts of human behavior as dependent on social and biological conditions.

647. Theoretical Psychology. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, sixteen hours in psychology. Mr. Dockeray.

Lectures and assigned readings bearing on the evolution of psychological theory in its relation to the physical and the social sciences.

650. Minor Problems. One or more credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, sixteen hours in psychology and the permission of the instructor. All instructors.

Investigation of minor problems in the various fields of psychology.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

652. Psychology of High School Subjects. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, a course in educational psychology. Mr. Pressey.

An analysis of the specific psychological processes involved in algebra, language, science, and other high school subjects, with consideration of the conditions which promote learning in each subject, and examination of textbooks and methods from this point of view.

Not open to students who have credit for Psychology 410.

653. Special Response Categories. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, sixteen hours in psychology. Mr. Dockeray.

An analysis of the more complex forms of human behavior. A continuation of Psychology 646.

654. Advanced Statistics. Three credit hours. Spring Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Psychology 612 or equivalent. Mr. Edgerton.

Special cases in correlation; non-linear regression; straight lines of best fit; construction of criteria; elementary probability; random sampling; derivation of commonly used equations; critical readings; construction of tables and graphs to meet the research needs of individual students.

655. Comparative Psychology. Five credit hours. Autumn Quarter. Five lectures each week. Mr. Williams.

The principles of animal behavior in relation to human behavior. A study of the similarities and differences in the behavior of animals and of humans and the explanation of these similarities and differences, with special reference to those principles definitely involved in the organism's instinctive and acquired mode of adjusting to its environment.

Not open to students who have credit for Psychology 627.

656. Comparative Psychology. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Psychology 655. Mr. Williams.

A continuation of Psychology 655. Devoted largely to contemporary literature in Comparative Psychology.

Not open to students who have credit for Psychology 627.

657. Comparative Psychology Laboratory. Three credit hours. Autumn Quarter. One lecture each week and laboratory periods to be arranged. Mr. Williams.

The methods and results of investigation of animal behavior in relation to human behavior.

658. Comparative Psychology Laboratory. Three credit hours. Winter Quarter. One lecture each week and laboratory periods to be arranged. Prerequisite, Psychology 657. Mr. Williams.

A continuation of Psychology 657.

659. University Personnel Psychology. Three credit hours. Autumn Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, ten hours of psychology. Mr. Toops.

A course designed for students who are preparing for positions in vocational guidance or personnel work in universities and those interested in the achievement of adults. The giving, scoring and interpretation of tests of university entrants. Reading tests and tests of special capacities of adults. Planning a testing program for adults. Theories of adult testing. Comparative study of University personnel programs and procedures. The content of the course will vary somewhat from year to year.

660. Comparative Psychology Laboratory. Three credit hours. Spring Quarter. One lecture each week and laboratory periods to be arranged. Prerequisite, Psychology 658. Mr. Williams.

A continuation of Psychology 658.

661. Psycho-Educational Problems. Two credit hours. One Quarter. Autumn, Winter, Spring. One four-hour period each week. Clinical studies of pupils presenting psycho-educational problems, under direction of instructor. Prerequisite, Psychology 619 and permission of instructor. Open only to Senior and graduate students. Mr. Goddard, Mr. Maxfield.

A student will be assigned to a public school where, under direction of the principal, he will make studies of individual pupils. Practical experience in problems of child guidance and educational adjustment as required by students who expect to become student counsellors, visiting teachers, or psycho-clinicians. Preparation of reports to the principal under direction of instructor.

Not open to students who have credit for the work of this course, taken as Psychology 650 (Minor Research) or 620 (Advanced Psychological Clinic).

662. The Pre-School Child. Three credit hours. Winter Quarter. Two lectures and one conference hour each week. Mr. Durea.

This course will present the elements of child nature, individual differences and fundamental appetites. The process of socialization will be considered in terms of the variety of situational settings impinging on the child. All of the content of the course will be concerned with the significance of early behavior patterns.

663. Psychology of the Elementary School Child. Three credit hours. Winter Quarter. Three lecture hours each week. This course alternates with Psychology 676. Mr. English.

Effect of the school environment upon the development and responses of the child. After-school activities and their relation to child development. Adaptation of the school to the child's needs.

674. Research Problems of the Dean of Women. One or more credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Survey 665, or its equivalent, and the approval of the instructor. Mrs. Gaw.

Investigation of the minor psychological problems which arise in connection with the social, scholastic, and vocational adjustments of undergraduate women.

†675. Personnel Forms and Interrogation Methods. Three credit hours. Autumn Quarter. Mr. Edgerton.

Techniques of the questionnaire; survey schedules; personnel forms; techniques of constructing valid questions and test items for prognosis, diagnosis, and measurement of attainment; item analysis. The student will construct examinations and personnel forms under supervision and class criticism.

†676. Methods and Viewpoints in Educational Psychology. Three credit hours. Winter Quarter. Three lectures each week. This course alternates with Psychology 663.

A critical appraisal of the implications for education of modern psychological movements from Preyer and G. S. Hall to the present day.

677. Graphic Methods. Two credit hours. Spring Quarter. Two lectures each week. Mr. Edgerton.

Graphic presentation of the results of experiments and investigations; histograms, bar charts, specialized charts; tri-dimensional presentation.

678. Psychology of Personality. Three credit hours. Spring Quarter. Three lectures each week. Mr. Durea.

This course will consider the individual both as a social and biological unit, relating each group of factors to the development of personality. Ample attention will be given to questions such as integration, measurement of traits, personality types, related physical and chemical factors, etc. The course is correlative to Psychology 641.

***701. Proseminary in Educational Psychology.** Two credit hours. Autumn Quarter. One two-hour discussion each week. Prerequisite, an acceptable course in educational psychology and the permission of the instructor. Only school people in active service will be admitted. Mrs. Pressey.

This course is offered exclusively for teachers in service. It will consist of lectures and readings upon one or more topics of importance in educational psychology. These topics will vary from year to year according to the needs of the group. Each teacher will be expected to work out some minor problem having to do with the main topic of the course.

FOR GRADUATES

Prerequisite for Graduate Work: A student who desires to become a candidate for an advanced degree, with psychology as a major subject, must previously have completed the equivalent of at least two years of psychology; or he must have completed one year of psychology and one year of college work in one of the following subjects: philosophy, mathematics, physiology, physics, zoology, sociology.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

801. Major Research. Three or more credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Primarily intended for students offering theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

802. Seminary in Experimental Psychology. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Renshaw, Mr. Dockeray, Miss Rogers.

803. Seminary in Educational Psychology. Two credit hours. Autumn and Winter Quarters. Mr. Pressey, Mr. English.

805. Contemporary Psychological Literature. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Renshaw.

806. Seminary in Abnormal Psychology. Two credit hours. Winter and Spring Quarters. Mr. Maxfield, Mrs. Stogdill.

807. Seminary in Industrial Psychology. Two credit hours. Spring Quarter.

808. Psycho-Analysis. Two credit hours. Autumn Quarter. Two lectures each week. Mr. Goddard.

This course will deal with the history and development of psycho-analysis; the theories of Freud, Jung, and others. Special emphasis will be placed on those concepts that are of value to teachers in their effort to appreciate the individual differences in students. The significance of the unconscious and the various methods of tapping the unconscious.

†**810. Psychological Problems in Higher Education.** Two credit hours. Autumn Quarter. One meeting each week. Prerequisite, permission of the instructor. Mr. Pressey.

A critical review of the research work thus far done on such problems as study methods, background information essential for college work, individual differences, placement tests, measurement of progress. The course is intended to give graduate students preparing for college or university positions contact with current educational research regarding the problems they will meet, and develop a research attitude toward these problems.

811. Advanced Theoretical Psychology. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Psychology 647. Mr. Dockeray.

*__815. Seminary in Psychological Statistics.__ Two credit hours in each of two successive Quarters. Autumn and Winter Quarters. One two-hour discussion period each week. Mr. Toops, Mr. Edgerton.

Statistical background equivalent to the sequence Psychology 608, 612, 654 is assumed.

820. Study of the Special Reading Difficulties of Children I. Three credit hours. Winter Quarter. Two meetings each week. Prerequisite, one year of graduate work in psychology. Open by permission of the instructor. Miss MacLatchy.

A review of the psychological studies of reading, an investigation of the reports of

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

the restraining of children handicapped by reading difficulties, the examination of reading tests to be used in diagnosis, and study of remedial measures and their suitability to meet specific difficulties.

821. Study of the Special Reading Difficulties of Children II. Four credit hours. Spring Quarter. One two-hour class period, one hour conference with the instructor, daily periods of practice each week. Prerequisite, Psychology 820. Miss MacLatchy.

Laboratory course in which the student has practical experience in diagnosing a child's handicaps and in prescribing and applying remedial measures.

PUBLIC HEALTH AND HYGIENE
Office, Hamilton Hall

ASSISTANT PROFESSORS SELBERT AND WILSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601. Personal Hygiene. Three credit hours. Winter Quarter. Three lectures or recitations each week. Elective, Medicine.

Component systems of the human body are considered from the point of view of their functions, toleration, and adaptation limits, habit effects, normal and abnormal states, with signs and indications thereof, common diseases with their prophylaxis, and the principles of emergency treatments. This course aims, in a somewhat technical manner, to point out the principles for maintaining personal health and efficiency.

602. Public Health Problems. Five credit hours. One Quarter. Autumn, Winter, Spring. Four class periods and one field trip each week. Students provide their own means of conveyance on trips. Mrs. Selbert.

A résumé of theories and discoveries pertaining to the causes and prevention of disease. An elementary consideration of the public health aspects of such problems as food supplies, water, sewage, refuse, ventilation, communicable diseases, maternity and infant welfare, housing and school hygiene, camp and rural sanitation, tuberculosis, cancer, goiter, quackery, mental and industrial hygiene, vital statistics, and health administration.

***603. Industrial Hygiene.** Three or five credit hours. One Quarter. Autumn, Winter, Spring. Three class periods each week, also one conference and two field hours when five credit hours are elected. Students provide their own means of conveyance on trips. Prerequisite, five college credit hours in chemistry, physics, and biology; or a background in economics, sociology, or industrial engineering. A previous or concurrent course in sociology or economics is recommended.

This course treats of the hygiene and safety of work as related to working efficiency, maximum production and the avoidance of lost time due to disability. The history and economics of industrial health, the dangerous trades, health hazards, accidents, occupational diseases, compensation matters, and methods of control, prevention, and industrial medical services are included.

604-605-606. Hygiene and Sanitation. Three credit hours. Autumn, Winter, and Spring Quarters. Two lectures and two hours of field work each week. Prerequisite, first three years in curriculum of Medicine. Mr. Wilson.

This course includes the hygiene and sanitation of the communicable diseases, the deficiency and occupational diseases as applied to preventive medicine. Immunity, heredity, and eugenics. The diseases arising from the puerperal state and the diseases

* Not given in 1932-1933.

of infancy and childhood with reference to their prevention. The protection and function of food; water supply, sewage, and refuse disposal; ventilation, heating and certain aspects of personal hygiene. Public Health administration, disinfection and demography.

In addition to the theory of the subject, the student is assigned practical problems in Hygiene and Sanitation.

608. Child Health. Two credit hours. One Quarter. Autumn, Winter, Spring. One lecture and one demonstration or excursion each week. Mrs. Selbert.

The principles of child welfare are considered including ante-natal, neo-natal, and post-natal periods of infancy; the pre-school and school age through early adolescent life. Disease conditions are not considered.

Not open to students who have credit for Public Health and Hygiene 403.

NOTE: For course in the Teaching of Nursing, see Department of Principles of Education, Course 770.

FOR GRADUATES

Prerequisite for Graduate Work: As a minimum qualification for the study of a graduate course in Public Health the student must be majoring in a biological science, or in education, or sociology, or industrial engineering, or mathematics, in which case he may elect as a minor Public Health 801 or 802 or 803. Prerequisite, five credit hours in Public Health 601 or 602 or 603 or two Quarters in Public Health 604-605-606.

Graduates of any class "A" medical school will be admitted upon their record. Any person holding a B.A. or B.S. degree or an equivalent degree from the Ohio State University or any other institution of like standing, will be permitted to major in Public Health provided preliminary training has been taken in his college course in the following subjects: Chemistry, 10 hours; Physics, 10 hours; Bacteriology, 5 hours; a biological science, 5 hours; and five hours in one of the following, which however may be pursued concurrently: Economics, Sociology, Mathematics, or Business Organization.

In order to meet these requirements, graduates of the Ohio State University should have had the following courses (see the Bulletins of the respective colleges), while graduates of other universities and colleges should have had their equivalents:

General Chemistry 401-402 or 411-412.

General Physics 411-412.

General Bacteriology 607.

A biological science: General or Elementary Zoology 401 or 411, or General Botany 401, or Physiology 407, or Anatomy 613.

Five additional hours in one of the following: Economics 401 or Sociology 401 or Mathematics 435 or Business Organization 680.

*801. Public Health: Research. Five to fifteen credit hours. Autumn Quarter. Investigational work with conferences and assigned reading. Prerequisite, five credit hours in one or more of the "600" courses in Public Health; upon permission the required "600" course or courses in Public Health may be taken concurrently.

The subject matter covered in this course will be adapted to the needs of the individual student.

*802. Public Health: Research. Five to fifteen credit hours. Winter Quarter.

For description see Public Health 801.

*803. Public Health: Research. Five to fifteen credit hours. Spring Quarter.

For description see Public Health 801.

* Not given in 1932-1933.

RHETORIC AND ENGLISH LANGUAGE
(See English)

ROMANCE LANGUAGES AND LITERATURES
Office, 111 Derby Hall

PROFESSORS HENDRIX, MOORE, HAVENS, AND ROCKWOOD, ASSOCIATE PROFESSORS ANIBAL AND DEMOREST, ASSISTANT PROFESSORS HAMILTON, GUTIERREZ, FOURE, AND SCHUTZ, MISS DAVIS, MRS. FOURE.

GRADUATE ROMANCE CLUB

The Graduate Romance Club fosters an interest in advanced work in the Romance Languages and Literatures. Its meetings, held monthly, consist of reports by graduate students or faculty members on their own investigations as well as on books and articles bearing on the field.

The problems of graduate students and themes suggested by faculty members will be discussed. Regular attendance of graduate students in the department is strongly urged.

FRENCH

405. Reading of French. No credit. One Quarter. Autumn, Winter, Spring. Not accepted as prerequisite to any other course in this department. This course is open only to graduate students who wish to acquire a reading knowledge of French.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in French in addition to any prerequisites stated in the description of the courses.

***600. French Literature of the Seventeenth Century, 1680-1715.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Rockwood.

The close of the seventeenth century. The Quarrel of the Ancients and the Moderns. Selected works of LaFontaine, LaBruyère, Fénelon, Bossuet, and Fontenelle will be read.

601. French Literature of the Seventeenth Century, 1600-1660. Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Rockwood.

The pre-Classic period: formation of the school of 1660. The Libertines, growth of French comedy and tragedy, The Précieuses, The French Academy will be discussed. Selected works of Malherbe, De Viau, Descartes, Balzac, and Corneille will be read.

602. French Literature of the Seventeenth Century, 1660-1680. Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Rockwood.

The school of 1660. Selected works of Pascal, Molière, Boileau, Racine, La Rochefoucauld, Mme. de Sévigné, and Mme. de Lafayette will be read.

* Not given in 1932-1933.

603. French Literature of the First Half of the Nineteenth Century. Five credit hours. Spring Quarter. Five recitations each week. Lectures, collateral reading, and reports. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature) or equivalent. Mr. Havens.

French literature from 1800 to 1850. The development of romanticism in the novel, poetry, and the theatre.

605. French Literature of the Fifteenth and Sixteenth Centuries. Three credit hours. Autumn Quarter. Three lectures each week. Given biennially. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Moore.

Villon, Rabelais and contemporaries.

606. French Literature of the Sixteenth Century. Three credit hours. Winter Quarter. Three recitations each week. Given biennially. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Moore.

Montaigne; the Pléiade.

607. French Literature of the Eighteenth Century (1700-1750). Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Havens.

Rapid reading, with lectures and reports. Fontenelle, Bayle, Crébillon, Voltaire, Montesquieu, Marivaux, and others.

***608. French Literature of the Eighteenth Century (1750-1789).** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Havens.

Rapid reading, with lectures and reports. Voltaire, Rousseau, Diderot, Beaumarchais, and others.

†609. The French Novel to 1850. Three credit hours. Winter Quarter. Three lectures each week. Given biennially, alternating with French 611-612. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Havens.

Rapid survey of the French novel during the sixteenth, seventeenth, and eighteenth centuries and the first half of the nineteenth century. Mme. de Staël, Chateaubriand, George Sand, Hugo, and Balzac. Lectures, reports, and collateral reading.

***610. The French Novel, 1850 to the Present Day.** Three credit hours. Spring Quarter. Three lectures each week. Given biennially, alternating with French 611-612. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Havens.

Flaubert, Maupassant, Zola, Daudet, France, Bazin, Loti, and others. Lectures, reports, and collateral reading.

611. The Comedy of Manners in the Nineteenth Century (1800-1880). Three credit hours. Autumn Quarter. Three lectures each week. Given biennially, alternating with French 609-610. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Rockwood.

La Pièce Bien Faite, La Pièce à Thèse, Picard, Scribe, Dumas fils, Augier, Sardou. Rapid reading with lectures and reports.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

612. The Comedy of Manners in the Nineteenth Century (1880-1914). Three credit hours. Winter Quarter. Three lectures each week. Given biennially, alternating with French 609-610. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Rockwood.

Le Theatre Libre, Becque, Curel, Hervieu, Lavedan, Donnay, Bernstein, Bataille, Guitry. Rapid reading with lectures and reports.

***615. French Lyric Poetry.** Three credit hours. Spring Quarter. Prerequisite, French 413-414 or 415-416 (Introduction to French Literature). Mr. Hamilton.

A detailed study of French poetry, particularly of the nineteenth century.

623. Cours de Style. Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, a "600" course in French Literature and permission of the instructor. This course is conducted in French. It is limited to twenty students. Mr. Fouré.

624. Cours de Style (Continued). Three credit hours. One Quarter. Winter and Spring. Three recitations each week. Prerequisite, French 623 and permission of the instructor. This course is conducted in French. It is limited to twenty students. Mr. Fouré.

625. Explication de Textes. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, French 624. This course is conducted in French. Mr. Fouré.

The course aims to introduce the student to a method of literary appreciation based upon a critical study of well selected texts representing the main characteristics of each writer.

626. Explication de Textes (Continued). Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, French 624. This course is conducted in French. Mr. Fouré.

Selections from the nineteenth century and contemporary authors.

†627. French Phonetics. Three credit hours. Three meetings each week with laboratory practice. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C," and permission of the instructor. This class is limited to twelve.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation. Careful drill in the reading of French. Designed for advanced students who expect to teach French.

Not open to students who have credit for French 632.

628. Modern French Syntax. Three credit hours. Spring Quarter. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C." Mr. Schutz.

A careful elucidation of French grammar, with composition to illustrate. Designed for advanced students who expect to teach French.

629. History of the French Language. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, French 628 or permission of the instructor. Mr. Schutz.

A rapid survey of the development of the French language, with special reference to the social and cultural conditions involved.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

632. **French Phonetics and Diction.** Five credit hours. One Quarter. Autumn and Winter. Five meetings each week with laboratory practice. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C," and permission of the instructor. The class is limited to twelve. Mrs. Fouré.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation and diction. Careful drill in the reading of French. Designed for advanced students who expect to teach French.

Not open to students who have credit for French 627.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 740.

ITALIAN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Introductory course in Italian in addition to any prerequisites stated in the description of the courses.

*601. **Modern Italian Literature (1800-1850).** Five credit hours. Spring Quarter. Five recitations each week. Miss Davis.

Foscolo, Manzoni, Pellico, Leopardi.

*602. **Modern Italian Literature (1851-1900).** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Moore.

Rovetta, Carducci, Giacosa, Fogazzaro.

607. **Italian Literature of the Renaissance.** Three credit hours. Autumn Quarter. Three recitations each week. Given biennially, alternating with Italian 611. Prerequisite, Italian 602 or the permission of the instructor. Mr. Moore.

Boiardo, Ariosto, Pulci, Machiavelli. Lectures, collateral reading, and reports.

608. **Italian Literature of the Renaissance (Continued).** Three credit hours. Winter Quarter. Three recitations each week. Given biennially, alternating with Italian 612. Prerequisite, Italian 602 or the permission of the instructor. Mr. Moore.

Bandello, Il Lasca, Castiglione, Cellini, Tasso. Lectures, collateral reading, and reports.

*609. **Survey of Italian Literature to 1400.** Three credit hours. Autumn Quarter. Three lectures each week. No prerequisite and no knowledge of a foreign language required. Mr. Moore.

English translations of Dante, Petrarch, Boccaccio. Lectures, readings, and reports will be in English.

*610. **Survey of Italian Literature (1400-1900).** Three credit hours. Winter Quarter. Three lectures each week. No prerequisite, and no knowledge of a foreign language required. Mr. Moore.

English translations of Ariosto, Machiavelli, Cellini, Castiglione, Tasso, Manzoni, and others. Lectures, readings, and reports will be in English.

*611. **Dante's Life and Works.** Three credit hours. Winter Quarter. Three lectures each week. Given biennially, alternating with

* Not given in 1932-1933.

Italian 607. Prerequisite, Italian 602 or the permission of the instructor. Mr. Moore.

Reading of the Vita Nuova and The Inferno, Cantos 1-16.

*612. Dante's Life and Works (Continued). Three credit hours. Spring Quarter. Three lectures each week. Given biennially, alternating with Italian 608. Prerequisite, Italian 611. Mr. Moore.

Reading of The Inferno, Cantos 17-34, Purgatorio and Paradiso.

SPANISH

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Acceptable courses in Spanish in addition to any prerequisites stated in the description of the courses.

605. Advanced Composition and Conversation. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Spanish 405 (Commercial Correspondence), and a "600" course in Spanish Literature. Mr. Gutierrez.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history and customs and manners of Spain.

606. Advanced Composition and Conversation (Continued). Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Spanish 605. Mr. Gutierrez.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history and customs and manners of Spain.

*607. The Modern Spanish Novel. Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

*608. The Modern Spanish Novel (Continued). Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

609. Romantic Drama and Poetry of the Nineteenth Century. Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 607-608. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the first half of the nineteenth century. Lectures, collateral reading, and reports.

610. Modern Spanish Drama. Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given

* Not given in 1932-1933.

biennially, alternating with Spanish 607-608. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the second half of the nineteenth century. Lectures, collateral reading, and reports.

*611. **Drama of the Golden Age.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 613-614. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

An intensive study of a limited number of plays of the representative dramatists. Lectures, collateral reading, discussion, and reports.

*612. **Drama of the Golden Age (Continued).** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 613-614. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

An intensive study of a limited number of plays of the representative dramatists. Lectures, collateral reading, discussion, and reports.

613. **Prose of the Golden Age.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 611-612. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

A study of the prose of the period with especial emphasis on the novel. Lectures, collateral reading, discussion, and reports.

614. **Cervantes.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 611-612. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

A study of the works of Cervantes, with especial emphasis on the Quixote. Lectures, collateral reading, discussion, and reports.

615. **Survey of Spanish Literature from the Earliest Times to the Seventeenth Century.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

Lectures, collateral reading, discussion and reports.

616. **Survey of Spanish Literature of the Seventeenth and Eighteenth Centuries.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

Lectures, collateral reading, discussion, and reports.

617. **Modern Spanish Syntax.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature) and the consent of the instructor. Mr. Anibal.

Study of syntax, designed for advanced students who expect to teach Spanish.

* Not given in 1932-1933.

620. Spanish Phonetics. Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature).

Careful and detailed study of special problems involved in teaching Spanish to English-speaking students. Laboratory analysis of differences between English and Spanish pronunciation.

Not open to students who have credit for Phonetics 605.

***626. The Spanish Drama of the Sixteenth Century.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 630. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Anibal.

†630. Survey of Spanish-American Literature. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 626. Prerequisite, Spanish 413-414 (Introduction to Spanish Literature). Mr. Hendrix.

A study of the masterpieces of Spanish-American literature. Lectures, collateral reading, discussion, and reports.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 745.

ROMANCE LANGUAGES

FOR GRADUATES

Students intending to major in Romance Languages are urged to elect the following courses outside the department: History of France (History 624, 625), Introduction to the Study of the History of Language (Greek 701), the History of Philosophy (Philosophy 601-602-603), the History of Critical Theory (English 805), Vulgar Latin (Latin 627), Comparative Literature (Latin 506). No student will be considered as a candidate for the M.A. degree unless his program includes at least two courses exclusively for graduates.

French 801 and 802 are required of candidates for the Master's degree in French.

Spanish 805 and 806 are required of candidates for the Master's degree in Spanish.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

FRENCH

801. Introduction to Old French. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, not less than three years of collegiate French. Mr. Schutz.

Elements of Old French phonology and morphology. Intensive readings in representative texts. A knowledge of Latin is recommended.

802. Introduction to Old French (Continued). Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, French 801. Mr. Schutz.

803. Old Provençal. Three credit hours. Autumn Quarter. Prerequisite, four years of collegiate French. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's Provenzalische Chrestomathie (Leipzig, 6th edition); Grandgent's Provençal Phonology and Morphology.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

804. Old Provençal (Continued). Three credit hours. Winter Quarter. Prerequisite, four years of collegiate French. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's Provenzalische Chrestomathie (Leipzig, 4th edition); Grandgent's Provençal Phonology and Morphology.

809. Research in French Language or Literature. Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, not less than four years of collegiate French and the permission of the instructor in charge. Mr. Moore, Mr. Havens, Mr. Rockwood, Mr. Schutz, Mr. Demorest.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

811. Seminary in French Literature. Three credit hours. Autumn Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Demorest.

Studies in specific literary fields.

812. Seminary in French Literature (Continued). Three credit hours. Winter Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Moore.

Studies in specific literary fields.

813. Old French Literature. Three credit hours. Spring Quarter. Prerequisite, French 801 or the equivalent. Mr. Schutz.

Rapid reading of Aucassin et Nicolette, selected works of Marie de France and Chrétien de Troyes. Reports on outside reading. Lectures on the main aspects of Old French Literature.

817. Seminary in French Literature. Three credit hours. Spring Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Havens.

Studies in specific literary fields.

SPANISH

805. Old Spanish. Three credit hours. Autumn Quarter. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix.

806. Old Spanish (Continued). Three credit hours. Winter Quarter. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix.

810. Research in Spanish Language or Literature. Two to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix, Mr. Anibal.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

815. Seminary in Spanish Literature. Three credit hours. Autumn, Winter, and Spring Quarters. Lectures, readings, and reports. Prerequisite, three years of collegiate Spanish and permission of the instructor in charge. Mr. Hendrix, Mr. Anibal.

†821. **Old Spanish Literature.** Three credit hours. Prerequisite, three years of collegiate Spanish and the permission of the instructor. Mr. Anibal.

El libro de buen amor, and other works not included in the usual survey courses.

PHONETICS

See Phonetics (Division), page 181.

RURAL ECONOMICS

Office, 113 Townshend Hall

PROFESSOR FALCONER, ASSISTANT PROFESSORS LIVELY, McBRIDE, FOSTER, HENNING, WERTZ, ARNOLD, HAUCK, AND FOSTER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in rural economics in addition to any prerequisites stated in the description of the courses. Courses 606 and 608 require also an introductory course in sociology.

Graduate students majoring in this department will find it desirable to elect several courses in the College of Commerce and Administration.

602. **Advanced Farm Organization.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Falconer.

A more detailed and advanced consideration of the economic principles involved in farm organization. The application of these principles to current agricultural production problems.

603. **Cooperation in Agriculture.** Five credit hours. Winter Quarter. Five lectures each week. Mr. Foster.

A study of agricultural cooperation, mainly as found in the United States. The types of cooperative marketing, manufacturing and purchasing organizations, collective bargaining, cooperative credit and insurance.

*604. **Land Tenure.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Falconer.

Historical and comparative study of land tenure with special reference to the relation of the landlord and tenant to each other and to the land. A land policy for the United States.

605. **The Agricultural Industry.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Falconer.

The importance of the agricultural industry to the welfare of the nation. Some characteristics of the farming industry. The maintaining of our agricultural output. Foreign competition, present and prospective. State and federal regulation, encouragement and aid to agriculture in the United States and foreign countries.

606. **Sociology of Farm Folk.** Five credit hours. Autumn Quarter. Mr. Lively.

A more comprehensive course than Rural Economics 405, designed to meet the needs of students who have had an acceptable course in sociology.

Not open to students who have credit for Rural Economics 405.

607. **Rural Social Organization.** Three credit hours. Winter Quarter. Prerequisite, Rural Economics 606 or permission of the instructor. Mr. Lively.

The need of rural organization; the conditions and units of successful rural organi-

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

zation, including a study of rural group life; the family, neighborhood, and community; the agencies and methods of rural organization, including a survey of existing organizations, their scope and aims, characteristics of successful leadership, its source and training; forces which favor and retard rural organization. Readings, lectures, discussions, and investigations.

608. Rural Social Environment. Three credit hours. Spring Quarter. Prerequisite, Rural Economics 606 or 607. Mr. Lively.

A consideration of the viewpoint of rural people regarding rural social questions and reforms through a study of the avenues of rural expression. Relation of present rural organization to this outlook. Changing rural agencies and their effects upon viewpoint. Students should have a first-hand knowledge of country life and some knowledge of psychology.

612. Price of Farm Products. Three credit hours. Spring Quarter. Three lectures each week. Mr. Arnold.

A study of the prices of farm land and of farm products. Adjusting the farm business to meet price fluctuations.

613. Marketing Farm Products. Five credit hours. One Quarter. Autumn and Spring. Five lectures each week. Mr. Foster, Mr. Henning.

A study of local and terminal marketing services and agencies involved in the marketing of farm products. Problems in marketing Ohio farm products.

614. Business Management in Agricultural Marketing. Three credit hours. Winter Quarter. Two lectures and one laboratory period each week. Mr. Foster.

A detailed study of representative agricultural marketing agencies, including their problems of administration, finance, selling, transportation and warehousing.

625. The Economics of Live Stock Marketing. Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Rural Economics 613. Mr. Henning.

The various methods of live stock marketing will be reviewed. Emphasis will be placed on recent developments of organized live stock marketing in the corn belt, country concentration, direct to packer shipping, choice of markets, etc. Time will be given to the analysis of shipping records and costs of marketing live stock. Various phases of management problems and difficulties uppermost in Ohio will be considered.

626. The Economics of Marketing Dairy Products. Three credit hours. Autumn Quarter. Two lectures each week. Prerequisite, Rural Economics 613. Mr. McBride.

A study of assembling, transportation, and marketing of dairy products with special reference to Ohio. Attention will be given to changing market areas, producers' cooperative movements, and manufacturers' consolidation activities. One or two inspection trips of two or three days will be made.

***627. The Economics of Grain Marketing.** Three credit hours. Spring Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Rural Economics 613.

A study of the problems involved in the movement and marketing of grain with special reference to Ohio conditions. Emphasis will be given to problems in local elevator management, future trading, hedging, transportation, world production areas and market movements. Attempts at terminal marketing by farmers will be considered.

628. The Marketing of Fruits and Vegetables. Five credit hours. Spring Quarter. Five lecture periods each week. Mr. Hauck.

The principles involved in marketing fruits and vegetables will be considered.

* Not given in 1932-1933.

Attention will be given to various phases of preparation for market, distribution, transportation, terminal facilities, auctions, inspection, market news, etc. Emphasis will be placed upon the market outlets and methods which are most suited to Ohio producers. One or two inspection trips of two or three days each will be made.

701. Special Problems. Three to fifteen credit hours, given in units of three or five hours a Quarter for one or more Quarters. Autumn, Winter, Spring. Prerequisite, at least eight hours of work in the department and the consent of the instructor. Mr. Falconer, Mr. Lively, Mr. McBride, Mr. Foster, Mr. Wertz.

This course is for students who desire to work out special problems in the field of rural economics and rural sociology.

FOR GRADUATES

Prerequisite for Graduate Work: The prerequisite for graduate work in this department is an acceptable course in the principles of economics or sociology, and one year's study of farm management and agricultural economics or sociology.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research Work and Seminary in Rural Economics. Three to six credit hours. Autumn, Winter, and Spring Quarters. Opportunity is offered to carry on special research in agricultural economics and rural sociology. Mr. Falconer, Mr. Lively, Mr. McBride, Mr. Foster.

SCHOOL ADMINISTRATION

Office, 211 Education Building

PROFESSORS LEWIS, CLIFTON, EIKENBERRY, KLEIN, AND OSBURN, ASSOCIATE PROFESSORS REEDER, HECK, AND DAVIS

For the guidance of students desiring a definite program preparing in one field in School Administration leading to the Master's degree, the following courses are suggested. Courses outside of the department will be suggested in conference with individual students. Candidates for the Ph.D. degree will be advised individually as their needs dictate. Every student is urged to consult with his adviser in the department as early as possible with reference to the courses he should take and the sequence of the same. The following courses are required of all graduate students majoring in School Administration: 601, 651, and 838. These courses should be taken as early as possible.

I. For junior and senior high school principals, vice-principals, heads of departments and supervisors; in addition to the three required courses above listed, the following courses are suggested but not required: 609, 625, 631, 651, 818, 831, 832. The order here given is not significant.

II. For elementary school principals and supervisors: 624, 628, 631, 640, 800, 836.

III. For city school superintendents, assistant superintendents and general administrative officers and supervisors: 624, 636, 827, 836, 850, 851, 855, 856.

IV. For county, village, and rural superintendents and school supervisors: 610, 624, 811, 827, 850, 851.

V. For research directors or specialists: 624, 625, 827, 835, 839, 850, 851.

VI. For persons specializing in teacher training or planning to teach school administration in a college or a university: consult adviser for suggested courses.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600. Fundamentals in School Administration for Teachers. Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures each week. Assigned readings. Mr. Lewis, Mr. Reeder, Mr. Davis, Mr. Clifton.

Treatment of those fundamental problems in school administration which affect the teacher's welfare. Designed as a basic course to give teachers a clearer under-

standing of the problems confronting the school administrator and of the teacher's part in solving them. Ohio school laws, regulations, and decisions.

601. Administration of Pupil Personnel. Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures each week. Assigned readings, investigations, and reports. Mr. Heck, Mr. Davis, Mr. Clifton.

Compulsory education laws and working certificates of Ohio; main requirements in other states. Census—information it should secure, its use, legal requirements in different states. Attendance—organization of departments, amount and causes of non-attendance, devices to improve attendance. School record systems—forms used, items recorded, and uses. Reporting systems. Need of uniformity in recording and reporting systems. Age-grade-progress studies. Elimination, grading, and promotion. Classification. Definition of terminology. Visiting teacher. Marking systems.

609. Administration of Extra-curricular Activities. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations, and reports. Mr. Eikenberry.

A study of those activities which fall outside of the group for which academic credit is ordinarily given. The relation of school administration to non-school community activities. Responsibility of the principal and superintendent for the school as a community center.

610. The Administration of Non-Urban Education. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations, and reports. Mr. Clifton.

An analysis of the problems of county and village superintendents; factors underlying rural school administrative problems; comparison of rural administrative problems in Ohio with those in other states.

616. Social Foundations of Public School Administration. Three credit hours. Spring Quarter. Lectures, investigations, and reports. Prerequisite, one year of experience or one course in sociology or philosophy. Mr. Lewis.

This course is designed to portray the significance of the community. A survey of the aim, organization and procedure in the supervision, management and control of public education from the standpoint of social philosophy. What the administrator should know in educational sociology.

618. Minor Research Problems. Two to four credit hours. Autumn, Winter, and Spring Quarters. Admission only on permission of the instructor and the chairman of the department. All instructors.

Investigation of minor problems in the various fields of school administration. A written report on the assigned problem will be required.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

***621-*622-*623. Proseminary (Teachers in Service).** Two credit hours. Two lectures each week. Assigned readings and reports. Open to superintendents, principals, and teachers in service by permission of the instructor in charge.

Topics for study will be determined by the group within certain limits set by the department.

624. Administration of Standard Tests in Elementary Schools. Three credit hours. Autumn Quarter. Three lectures each week. As-

* Not given in 1932-1933.

signed readings and reports. Open to graduate students of experience with permission of the instructor in charge. Mr. Osburn.

Selection of tests and organization of testing program for elementary schools; administrative problems involved in different types of schools and school systems; publicity and reports; use of data in formulating and evaluating administrative policies, remedial programs; the organization and work of bureaus of educational research.

625. Administration of Standard Tests in Secondary Schools. Three credit hours. Winter Quarter. Three lectures each week. Assigned readings and reports. Open to graduate students of experience with permission of the instructor in charge. Mr. Heck.

Selection of tests and organization of testing program for secondary schools; the use of mental and educational tests in classification, diagnosis, prognosis, and educational guidance; adaptations of organization, curricula and method to the educational needs of pupils of junior and senior high school age; recent investigations through the use of tests in the field of secondary education.

†626. Administration of Health Education. Three credit hours. Three lectures each week. Assigned readings, investigations and reports.

The place of health administration in school administration. Medical inspection; school nurse, dentist, and home visitor. Relation of school authorities to public health education. Hygiene of instruction; health of the teacher.

628. Administrative Problems of the Elementary School Principal. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings and reports. Open with permission of instructor in charge. Mr. Osburn.

An analysis of the work of the elementary school principal. The principal's relation to the community, parents, pupils, building custodian, teachers, superintendent, supervisors, and other officials of the central office. Different types of elementary schools—e.g., platoon, duplicate, departmentalized, three-track system, graded mental levels. Qualifications necessary for effective leadership. Office routine, business management, supervision.

631. Organization of the Junior High School. Three credit hours. Winter Quarter. Three lectures each week. Assigned readings and reports. Open with permission of the instructor in charge. Mr. Eikenberry.

A functional analysis of the work of the junior high school principal. Adaptation to school organization needed for attaining the objectives of the junior high school. The problems involved in junior high school organization in city and county school systems.

636. School Publicity. Two credit hours. Spring Quarter. Two lectures each week. Assigned readings, investigations, and reports. Open to superintendents, principals, and graduate students of experience by permission of the instructor in charge. Mr. Reeder.

A study of both continuous and campaign publicity for schools through use of contests, exhibits, printed reports, newspapers, etc.; organization of publicity; means of securing support; the checking of results.

†638. Administration of Radio Education. One credit hour. Assigned readings and reports. Open on permission of instructor and chairman of department. Mr. Charters and others.

This course is designed for teachers and administrators who are directly or indirectly supervising radio educational programs. The items covered include policies, securing of

† Not given during the academic year, 1932-1933.

talent, the determination of hours of service, the selection of topics which fit into the programs of schools and the evaluation of the service.

640. Administration of the Curriculum in the Elementary School. Three credit hours. Autumn Quarter. Assigned readings, investigations, and reports. Open on permision of the instructor in charge. Mr. Osburn.

An examination of the experimental evidence bearing upon the administrative problems concerned with the curriculum of the first six grades. Placement of subject matter in the elementary grades; program making for different types of schools; problems involved; regular and special subjects. Standards for selection of textbooks; administration of free textbooks.

†645. Administration of School Libraries. Two credit hours. Four lectures each week. Assigned readings and reports. Open with permission of the instructor in charge.

Designed to meet the needs of school librarians and general administrative school officers. Principal topics: history and development of the school library; its place in educational systems; standards and state regulations; rooms, equipment, and budgets; selection, acquisition, and care of books; publicity and cooperation with other agencies; instruction in the use of books; relation of librarian to teachers and school officials.

650. Administrative Problems of the Non-Urban Secondary School Principal. Three credit hours. Winter Quarter. Three lectures each week. Mr. Clifton.

An analysis of the work of the secondary school principal in non-urban districts. The principal's relation to community, parents, pupils, building custodian, teachers, superintendent and other officials.

A study of the special administrative problems peculiar to non-urban secondary schools together with the problem of organizing and administering village and rural high school districts and schools, including the program of studies, the schedule of recitations, records and reports, health and safety administration, school library, examinations, marks and promotions, educational and vocational guidance, disciplinary control, extra-curricular activities, supervision, tests and measurements. This course is particularly designed for beginning superintendents and principals whose first field of endeavor will be the administration of small high schools.

Not open to students taking School Administration 831 or 832.

651. Fundamentals in School Administration for Administrators. Three credit hours. Winter Quarter. Three lectures each week. Assigned readings. Mr. Reeder.

An introductory course for persons preparing for school administrative positions. The main topics are: the federal government and education; state administrative and supervisory organization; local administrative organization; finance and business administration; the plant; the teaching corps; the pupils; the curriculum, textbooks, and libraries; records, reports, and publicity.

Not open to students who have credit for School Administration 600.

†658. Administration of School Financial Accounting in Ohio. Two credit hours. Assigned readings, problems and reports. Mr. Davis.

A study of the financial accounting systems in use in Ohio school districts including a consideration of underlying principles and legal regulations as well as actual practice in preparing budgets, financial statements and contracts, auditing payrolls, and the supervision of such clerical details as the keeping of books, minutes and other records.

***660. Organization and Administration of Speech Correction in the Public Schools.** Three credit hours. Prerequisite, Psychology 609 and

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

Phonetics 630, or consent of the instructor. These two courses may be taken concurrently with School Administration 660.

Different types of speech handicaps; methods of selecting cases; organization of classes; equipment and supplies; qualifications of teachers; supervision; follow-up; measuring results.

†670. Administration of Teacher Retirement and Pension Systems. One credit hour.

A general introductory treatment of the problems involved in creating and maintaining an adequate retirement system for the teachers of a state.

674. Organization and Administration of the Education of the Mentally Retarded. Three credit hours. Winter Quarter. Prerequisite, Psychology 609 and Principles of Education 654, or consent of the instructor. These two courses may be taken concurrently with School Administration 674. Mr. Berry.

Characteristics of the mentally retarded; educational objectives; selection of cases; location and equipment of special classes; course of study; supervision; qualifications of teachers; cooperation with outside agencies; vocational guidance and training; placement and follow-up; cost; appraisal of results.

675. Organization and Administration of the Education of Behavior Problem Children. Three credit hours. Winter Quarter. Prerequisite, Psychology 609 or consent of the instructor. Mr. Berry.

Characteristics of the emotionally unstable, the nervous, and the delinquent; selection of cases; organization of classes and schools; equipment and supplies; course of study; supervision; guidance, placement and follow up; appraisal of results.

†690. Institute for Officers of Classroom Teachers' Associations. One to three credit hours. Open to graduates and undergraduates by permission of the instructor.

This course is offered at the request of the National League of Teachers' Association and is designed to afford the League and all its affiliated organizations and other teachers' organizations a National Institute for the consideration of the manifold problems with which officers and prospective officers of teachers' associations have to deal.

NOTE: For Physical Education 645, three credit hours, Administration of Physical Education for Administrators and Supervisors, see pages 185 and 187.

NOTE: For Practical Arts and Vocational Education 625, three credit hours, Administration of Industrial Arts and Vocational Education, see page 206.

FOR GRADUATES

Prerequisite for Graduate Work: Those desiring to do graduate work with school administration as their field of specialization must have not less than one year of satisfactory experience in educational service, in addition to three credit hours in school administration, and six credit hours in either psychology, sociology, economics, philosophy, history of education, or principles of education.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

800. The Preparation of Theses and Other Scientific Papers. One credit hour. Winter Quarter. Open with permission of the instructor. Mr. Reeder.

Emphasizes how to prepare a thesis. The following topics, among others, are

† Not given during the academic year, 1932-1933.

discussed: the scientific nature of the thesis; the selection, delimitation, and planning of the problem; the working bibliography; the collection of material; the organization and interpretation of material; the necessity for good English; the form of citations and footnotes; the preparation of statistical tables; the preparation of illustrations; the final bibliography; and suggestions on publication.

801. Administration of Colleges and Universities. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations and reports. Open on permission of instructor in charge. Mr. Klein.

An investigation of the various types of control, organization, and administrative policies as illustrated in selected colleges, universities, technical schools, junior colleges.

802. Seminary in School Administration. Two to five credit hours. Autumn, Winter, and Spring Quarters. Open to superintendents, principals, and teachers of graduate standing by permission of the instructor in charge. All instructors.

A study of general administrative problems.

803. Ad Interim Projects. Two to five credit hours. Autumn, Winter, and Spring Quarters. Open to superintendents, principals, and teachers of graduate standing who are in active service, by permission of the chairman of the department. All instructors.

Projects carried on by graduate students who have been enrolled previously in the department.

805-806-807. Major Research Problems. Three credit hours or more. Autumn, Winter, and Spring Quarters. All instructors.

Investigation of administrative problems leading to preparation of theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

811. State Administration of Education. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations, and reports. Open to graduate students only. Mr. Clifton.

A comparative study of school administration in the various American states including such topics as federal and state policies, forms of control, revenue and its apportionment, the state and the teacher, the state and the child, the state and non-state education, with particular reference to Ohio.

Not open to students who have credit for School Administration 611.

†812. Administration of National Systems of Education. Three credit hours. Three lectures each week. Assigned readings, investigations, and reports.

A comparative study of school administration in the various foreign countries.

Not open to students who have credit for School Administration 612.

813. Legal Basis of School Administration. Three credit hours. Spring Quarter. Mr. Reeder.

A study of the laws and judicial decisions of various states, relating to education, in order to discover the legal principles involved. Major topics: authority and responsibility of teachers; rights, privileges, and responsibilities of students; teachers' contracts and pensions; legal and illegal use of school property; contractual capacity and liability of public school officials; school boundaries and districts; taxation; legal aspects of the cur-

† Not given during the academic year, 1932-1933.

riculum; expenditures of school money. Primarily for supervisory and administrative officials.

†815. **Seminary in County School Administration.** Two to five credit hours. Open on permission of the instructor in charge. Prerequisite, School Administration 610. Mr. Davis.

A study of the special problems in county school administration.

†816. **Seminary in School Finance and Business Management.** Two to five credit hours. Open on permission of the instructor in charge. Prerequisite, School Administration 607, 608, 850, or 851. Mr. Reeder.

A research course dealing with some of the more urgent problems in the financing and business managing of the public schools; each member of the class will study and report on one such problem.

†817. **Seminary in Secondary School Administration.** Two to five credit hours. Open to principals of junior and senior high schools and teachers of graduate standing by permission of the instructor in charge. Mr. Eikenberry.

Research investigation of administrative problems in junior and senior high school administration and management.

818. **Administration of the Curriculum in the Secondary School.** Three credit hours. Winter Quarter. Assigned readings, investigations, and reports. Prerequisite, Principles of Education 625. Open on permission of the instructor in charge. Mr. Eikenberry.

A study of administrative procedures necessary for the efficient functioning of junior and senior high school curricula. Consideration will be given to the organization of the program of studies, staffing the program, the schedule of recitations, material equipment, selection of textbooks, improvement of study, examinations, marks and promotions.

Not open to students who have credit for School Administration 604 or 642.

†820. **The Administration of Curriculum Reorganization.** Three credit hours. Assigned readings, investigations, and reports. Open on permission of the instructor in charge. Mr. Charters.

The major objective of this course is to acquaint principals, superintendents, and other interested persons with the methods used in organizing and carrying on a cooperative project in curriculum reorganization within a school system. Organization charts will be prepared; the duties of committees will be studied; criteria for the selection of the content of the courses of study will be canvassed; and bibliographies for the use of subject-matter committees will be presented and enlarged.

825. **Problems in the Administration of Teacher Placement Agencies.** Two credit hours. Winter Quarter. Mr. Anderson.

A study of the function, place, organization and administration of teacher placement agencies in relation to the public schools.

826. **The Administration of Guidance Programs.** Two credit hours. Autumn Quarter. Assigned readings, investigations, and reports. Not open to classroom teachers. Classroom teachers desiring a course in guidance should elect Practical Arts and Vocational Education 470 and 607. Mr. Eikenberry.

Designed for high school principals and other administrative officers in junior and senior high schools and junior colleges. The place of educational and vocational guidance in secondary school administration, organization for guidance, financial support of the

† Not given during the academic year, 1932-1933.

guidance program, examination and study of typical guidance programs in large and small school systems.

827. Personnel Administration and Supervision in Education. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings and reports. Open with permission of the instructor in charge. Mr. Lewis.

A study of personnel problems that arise in the management of the supervisory and teaching staff of a public school system with special attention to methods of selection, appointment, in-service preparation, assignment, rating, teacher's load, marital condition, promotion, absenteeism, contracts, certification, dismissal, ethics, pension, tenure turnover, salary schedules, etc.

Not open to students who have credit for School Administration 605.

***830. Administrative Problems of the City Superintendent.** Three credit hours. Three lectures each week. Assigned readings and reports. Open on permission of the instructor in charge. Mr. Lewis.

An analysis of the work of the superintendent of city schools. A clearer definition of the working relationships that should exist between the superintendent and board of education, other municipal officials, state and county officials, the public, assistant or subordinate school officials and teachers. The social and legal status of the city superintendent.

Organization of city school systems: intermediate schools, summer schools, vocational schools, evening schools, junior colleges, community centers. Methods of securing cooperation with other public welfare agencies.

Not open to students who have credit for School Administration 630.

831. High School Administration (City). First Course. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings and reports. Open on permission of the instructor in charge. Mr. Eikenberry.

A study of the special administrative problems of the urban high school including the teaching staff and its organization, the pupil population, teachers' loads, the schedule of recitations, routine administration, health and safety administration, school records and reports, building administration, vocational guidance, and disciplinary control.

Not open to students who have credit for School Administration 650, 629 or 632.

832. High School Administration (City). Second Course. Three credit hours. Winter Quarter. Three lectures each week. Assigned readings and reports. Open on permission of the instructor in charge. Mr. Eikenberry.

A continuation of School Administration 831 dealing with such administrative problems as the principal's office, records and reports, daily administration, building administration, administration of health and safety, the high school inventory, high school costs, the high school budget, and reports to state departments of education and other higher authorities.

Not open to students who have credit for School Administration 633.

†833. Administrative Problems of the Large Cosmopolitan High School. Three credit hours. Assigned readings and reports. Open with permission of the instructor in charge.

A study of the special administrative problems of the large cosmopolitan high school including schedule making, staff organization, organization of the program of studies, teachers' loads, administration of pupil activities, administration of the guidance program, records, reports, and school attendance.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

†835. **Administration of Experimental Schools.** Two to four credit hours. Assigned readings and reports.

A special course designed to orient administrators and teachers with respect to education along the Platoon, Dalton, and Winnetka plans and other types of experimental, administrative, and teaching technique. Discussion of advantages and disadvantages of each type compared with traditional education. The organization, cost, method of management, type of equipment, schedule, type of teacher and special features.

Not open to students who have credit for School Administration 655 or 657.

836. **Administration of Special Education.** Three credit hours. Spring Quarter. Three lectures each week. Assigned readings and reports. Open with permission of the instructor in charge. Mr. Heck.

History and development of special schools and classes; types defined; place in education; state encouragement and regulations; types of control; internal government; buildings and rooms; equipment; costs, teacher-training, experience, salaries; selection of other employees; characteristics of children; principles governing admittance, retention, and withdrawal; curriculum—academic, industrial, extra-curricular; methods of follow-up, etc.

Not open to students who have credit for School Administration 637.

†838. **Educational Statistics: Elementary.** Three credit hours. Two lectures and one two-hour laboratory period each week.

A basic statistical course for students intending to conduct major or minor research. Frequency distributions; methods of measuring central tendencies and variability; construction of graphs and charts; interpretation of results in terms of probability; simple treatment of correlation.

Not open to students who have credit for Psychology 608 or School Administration 613 or 643.

NOTE: Students desiring to study statistics in the Autumn or Winter Quarter will elect Psychology 608 or 612.

†839. **Educational Statistics: Intermediate.** Three credit hours. Two lectures and one two-hour laboratory period each week. Prerequisite, Psychology 608 or School Administration 643 or 838, or equivalent.

Fuller treatment of correlation; regression coefficients and equations; partial and multiple correlation; uses of normal probability curve; reliability and validity of test data; comparable measures.

Not open to students who have credit for Psychology 612 or School Administration 644.

NOTE: Students desiring to study statistics in the Autumn or Winter Quarter will elect Psychology 608 or 612.

840. **Administration of the Junior College.** Three credit hours. Spring Quarter. Assigned readings, investigations and reports. Open on permission of instructor and chairman of the department. Mr. Klein.

The origin and development of junior colleges, including a critical survey of the several types, private, state, and municipal. Considerable attention will be devoted to the basic reasons for the junior college movement and the place which various types of junior college curricula may fill in the educational system. Problems of internal administration and the possibilities of the readjustment in higher education as a result of the development of junior colleges will be discussed.

843. **Administration of Teacher Training Institutions.** Three credit hours. Autumn Quarter. Assigned readings, investigations, and reports.

† Not given during the academic year, 1932-1933.

Open by permission of instructor and chairman of the department. Mr. Klein.

A course intended for those who expect to administer these schools. The development of teacher training; functions of normal schools, and of teachers' colleges; the administrative organization; financial support; training of faculties; records, publications, and equipment; specialization of normal schools; personnel; work of special offices such as deans, health department, principal of training school, critic teachers; personal and class investigations of schools required as a feature of the course.

844. Financial Administration in Higher Education. Three credit hours. Spring Quarter. Three lecture hours each week. Open on permission of the instructor and chairman of the department. Assigned readings, investigations and reports. Mr. Klein.

Revenues, financial accounting, unit costs, allocation of costs, endowments, bequests, federal aid, state support, budgetary procedures, accounting forms, inventories, maintenance, student aids, investment of funds, cooperative purchasing, business staff, terminology.

845. Seminary in Administration of Higher Education. Two to four credit hours. Autumn and Spring Quarters. Open by permission of instructor. Mr. Klein.

A research course dealing with some of the more urgent problems in the organization and administration of higher education designed particularly for those writing theses and pursuing research in this field.

850. Business Management of Schools. Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, investigations and reports. Open with permission of the instructor in charge. Mr. Reeder.

Function of business administration in the schools; administrative relationships; personnel of the business department; making the budget; procuring revenue; financial accounting; planning and constructing a building; architectural service; selecting and purchasing building sites; financing capital outlays; use of buildings; maintenance of the plant; the janitor; insurance of property; taking the inventory; school supplies; pay roll precedure; school transportation.

Not open to students who have credit for School Administration 608.

851. School Finance. Three credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations, and reports. Open with permission of the instructor in charge. Mr. Reeder.

The literature and sources of data; trends of school costs; outlook for future costs; possible school economies; school expenditures vs. ability to expend; sources of school revenues; meeting a financial stringency; the equalization of educational opportunity; the control of school funds; school indebtedness.

Not open to students who have credit for School Administration 607.

855. Planning and Construction of School Buildings. Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, observation trips, and reports. Open with permission of the instructor in charge. Mr. Holy.

A study of types of buildings, choice of site, construction and suitability for educational needs. The use of score cards for rating buildings: rural, village, and city. Standards for maintenance, repairs, and janitorial service. Methods of studying efficiency of various types of service systems.

Not open to students who have credit for School Administration 606 or 647.

†856. **Equipment of School Buildings.** Two credit hours. Spring Quarter. Two lectures each week. Assigned readings, observation trips, and reports. Open with permission of the instructor in charge.

A study of present-day equipment for school buildings. Layouts for special and regular rooms; fixed and movable furniture. Methods of determining choice in relation to quality, use and cost.

Not open to students who have credit for School Administration 648.

870. **Seminary in the Administration of Elementary Education.** Two to five credit hours. Autumn Quarter. Open to principals and superintendents of schools having graduate standing. Prerequisite, School Administration 624, 628, and 640. Mr. Osburn.

A research course designed for those working on theses and research projects in the field of elementary education.

872. **The Administration of Achievement Tests in Higher Education.** Three credit hours. Winter Quarter. Assigned readings, investigations, and reports. Prerequisite, Psychology 608 or School Administration 838 and permission of the instructor in charge. Mr. Tyler.

The major objective of this course is to acquaint research workers, college instructors, and other interested persons with the methods used in organizing and carrying on a cooperative project in test construction in a college or university. The function of tests, the methods of construction, the relationship of the college instructor and the educational research worker will be considered. Criteria by which tests may be evaluated will be canvassed and practice in test construction provided.

878. **Seminar in the Administration of College Student Personnel.** Two credit hours. Winter Quarter. Prerequisite, ten hours of psychology and permission of the instructor. Psychology 659 or 639 recommended as prerequisite. Mr. Cowley.

A discussion of problems in the field of college student personnel as distinguished from instruction and general administration. An appraisal of administrative techniques used in personnel work. A discussion of the organization of large and small college and university student personnel programs, and an evaluation of the research material developed in the personnel program of The Ohio State University, together with an examination of the growth of the personnel movement and its future in higher education.

SOCIOLOGY

Office, 109B Commerce Building

PROFESSORS HAGERTY, NORTH, LUMLEY, MARK, AND STILLMAN, ASSOCIATE PROFESSOR DENUNE, ASSISTANT PROFESSOR JONES, MR. PATERSON, MISS SPAETH, MR. MASON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in sociology in addition to any prerequisites stated in the description of the courses.

601. **The Family.** Four credit hours. One Quarter. Autumn and Spring. Miss Spaeth.

A survey of types of family organization from primitive times to the present; an analysis of the factors that entered into their development; the modern family and an analysis of modern family problems.

602-603-604. **General Sociology.** Three credit hours. Autumn, Winter, and Spring Quarters. Open only to Seniors and graduate stu-

† Not given during the academic year, 1932-1933.

dents who have had no previous work in general sociology. Mr. Lumley.

A general course covering the materials of Sociology 401-402, but adapted to the needs and capacities of more mature students.

605. The Immigrant. Four credit hours. Winter Quarter.

A study through the various immigrant groups of social attitudes resulting from political, religious, economic, and social relations of groups. The psychological and practical problems of adjustment. General principles of group relationship rather than specific methods of procedure.

607. The Race Problem. Four credit hours. Autumn Quarter.

Survey of contemporary and potential race contacts and conflicts throughout the world. Development of race consciousness. Relations of Caucasians, Negroes, Indians, and Mongolians in the United States.

608. The Negro Problem. Four credit hours. Spring Quarter.

A study of the local situations, attitudes, and progress of the American Negro and methods of dealing with interracial problems.

611. Introduction to Anthropology. Four credit hours. Winter Quarter. Textbook, lectures, papers, and discussions. Miss Spaeth.

The field of anthropology; origin and antiquity of man, his essential characteristics, relation to the animal kingdom; the criteria of race distinction; the several races and some anthropological problems.

Not open to students who have credit for Sociology 411.

612. Social Anthropology. Four credit hours. Spring Quarter. Prerequisite, Sociology 611. Textbook, lectures, papers, and discussions. Miss Spaeth.

A study and analysis of types of social organization of primitive man, such as class, family, political organization, religion, etc.

Not open to students who have credit for Sociology 412.

***613. Cultural Anthropology.** Three credit hours.

A study of special problems in cultural anthropology.

618. Poverty. Three credit hours. Winter Quarter. Mr. Hagerty.

Extent, nature, and causes of poverty. Outlines of a program of prevention. The relation of the standard of living to social welfare. The relation of minimum wage laws to poverty.

619. Social Treatment of Dependents. Three credit hours. Autumn Quarter. Miss Jones.

Principles and methods underlying public and private agencies in aiding needy families living in their own homes. Mothers' pensions. Treatment of the mentally and physically handicapped, the blind, deaf, crippled, epileptic, feebleminded, homeless and aged. Visits to state and other institutions for the care of these groups.

620. Social Treatment of the Child. Three credit hours. Winter Quarter. Miss Jones.

Principles and methods of caring for dependent and neglected children in their own homes, in foster homes, and in institutions. Protective work for the maladjusted and problem child.

621. The Community and the Child. Three credit hours. One Quarter. Autumn, Winter, Spring. Open only to students in Home Economics who do not have credit for Sociology 601 or 617. Students from other departments admitted only with the consent of instructor. Miss Spaeth.

The family as a social institution, its historical development and present status.

* Not given in 1932-1933.

Modern conditions affecting home life. The child as affected by economic and social factors outside the home. The dependent and the neglected child. Social legislation affecting the child. Social responsibility toward the child.

625. The Criminal. Three credit hours. Spring Quarter. Mr. Hagerty.

The social, economic, and physiological causes of crime. The changing character of crime as modified by the legal code. Types of criminals, the instinctive, habitual, professional, etc. The classical and positive schools of criminology. The relation of feeble-mindedness and degeneracy to crime. Juvenile crime, its causes and prevention.

626. Penology. Three credit hours. Autumn Quarter. Prerequisite, Sociology 625. Mr. Hagerty.

The evolution of the methods of criminal procedure with an analysis and criticism of present-day methods. The organization and administration of penal institutions. As visits will be made to courts, jails, and prisons, students who take this course should be free to make these visits Saturday mornings.

627. Penology. Three credit hours. Winter Quarter. Prerequisite, Sociology 626. Mr. Hagerty.

The Juvenile Court, its organization, and the legal procedure it introduces. The indeterminate sentence, probation and parole. The individual treatment of delinquents.

***628. Probation.** Three credit hours. Admission by consent of instructor.

The organization of juvenile and adult probation. The individual treatment of the delinquent. The practice of states having probation systems. Does probation increase or decrease crime?

638. Field Work in Social Statistics. Five credit hours. One Quarter. Autumn and Spring. Three recitations and four hours in field or laboratory each week. Miss Mark.

Statistical investigation of some phase of the social life of the city. Drafting and using of schedules. The statistical interview. Editorial processes. Drafting of tables. Tabulation.

Not open to students who have credit for Sociology 635 and 636.

639. Social Statistics. Five credit hours. Winter Quarter. Three recitations and two two-hour laboratory periods each week. Miss Mark.

The interpretation of statistical data. Averages and ratios, measures of dispersion, graphic presentation, statistical text. A study of the fields of population and vital statistics, statistics of dependency, delinquency, and standard of living.

Not open to students who have credit for Sociology 637.

***640-*641. Sources of Social Data.** Three credit hours. Autumn and Winter Quarters. Miss Mark.

A survey of both primary and secondary sources of information available to the student of social conditions; where such information is to be found; under what conditions and with what limitations it is available to the investigator; in what degree it is reliable and trustworthy; what value it has for specific uses.

642. Case Recording. Three credit hours. One Quarter. Winter and Spring. Open to graduate students by permission of the instructor. Miss Jones.

A study of case history writing and office methods of social case work agencies.

* Not given in 1932-1933.

645. Leisure and Recreation. Four credit hours. Autumn Quarter. Mr. Mason.

The sources of leisure in early and modern society. The social significance and uses of leisure. The social functions of play. Historical aspects of play. The recreation problem of modern communities from the standpoint of control and of public provision.

646. Social Organization and Administration of Recreation Facilities. Four credit hours. Winter Quarter. Prerequisite, Sociology 645. Mr. Mason.

Methods and means of control of commercialized recreation with special reference to American cities and towns. The promotion and organization of public and semi-public agencies. The administrative control of playgrounds, social centers, clubs, and other non-commercialized agencies. The coordination of the recreation facilities of the community.

647. The Organization and Direction of Group Activities. Three credit hours. Autumn Quarter. Lectures, readings, practical demonstrations, field work. Open to Seniors in Social Administration and in Education, and graduate students. Prerequisite, Sociology 645. Mr. Mason.

A consideration of the problems and methods of directing boys' and girls' clubs and other similar groups. The use of story telling, group singing, social dramatics, games, including demonstrations and instructing in the various techniques.

649. Camping: Its Organization and Administration. Three credit hours. Spring Quarter. Lectures, readings and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is given jointly by the Departments of Physical Education and Sociology. Prerequisite for Social Administration students, Sociology 645. Prerequisite for Physical Education students, fundamental courses in Sociology and fifteen hours in the Theory and Practice of Physical Education. Mr. Mason, Mr. Metcalf, Miss Alway.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstration in camping will be included.

This course is the same as Physical Education 649.

***650. Boys' Work Organization.** Four credit hours. Autumn Quarter. Prerequisite, Sociology 645 and 646.

A study of the organization and methods of work of the principal agencies engaged in boys' work, such as the Boy Scouts, Young Men's Christian Association, Settlement Clubs for Boys. The principal part of the instruction will be given by specialists from the various agencies. Practical field work with some one of the agencies during the course will be required.

651. Girls' Work Organization. Five credit hours. Spring Quarter. Prerequisite, Sociology 645 and 646.

A study of the plan of organization and methods of work of the principal agencies engaged in girls' work, such as the Girl Scouts, Camp Fire Girls, Young Women's Christian Association, Settlement Clubs for Girls. The principal part of the instruction will be given by specialists from the various agencies. Practical field work with some one of the agencies during the course will be required.

655. Municipal Sociology. Four credit hours. Spring Quarter.

The place of the city in social organization. Comparison of the ancient, medieval, and modern city. Causes of growth of modern cities. Composition of urban population.

* Not given in 1932-1933.

Racial, cultural, and economic groupings of population. Problems of city planning, housing, health, intellectual, and aesthetic satisfaction. Control of vice and crime. Agencies for the cultivation and expression of civic interest.

656. Rural Social Institutions. Four credit hours. Spring Quarter. Mr. Denune.

The problems of health, recreation, social intercourse, housing, child welfare, dependency, defectiveness, and delinquency in American rural communities and small towns. The agencies and organizations dealing with these problems.

657. Welfare Problems in Rural Communities. Four credit hours. Autumn Quarter. Prerequisite, Sociology 656 or Rural Economics 606. Mr. Denune.

The relation of the school, the church, the Christian Associations, recreational societies, relief agencies, and the Juvenile Court to welfare problems in rural communities and small towns. A consideration of recreation, social intercourse, health, child welfare, dependency, defectiveness, and delinquency. This course is designed to give the rural teachers, ministers, and social workers a knowledge of the welfare problems which exist in rural communities and the methods by which they are being approached by rural workers.

658. Rural Welfare Organization and Administration. Four credit hours. Winter Quarter. Prerequisite, Sociology 657 and 695. Mr. Denune.

The application of social case work methods to rural conditions. A critical analysis of the rural social work plans of various states, e.g., North Carolina, Iowa, Missouri. The history, organization and administration of Rural Social Work agencies.

665. Social Order and Social Control. Three credit hours. Autumn Quarter. Textbooks, lectures, papers, and discussions. Mr. Lumley.

The social order, its nature, its varieties, its origin; the agencies of social control, such as custom, conventionality, social suggestion, public opinion, law, education, religion, art, ceremony, ideals, personality. Additional readings for graduate credit.

666. Social Evolution. Three credit hours. Winter Quarter. Textbooks, lectures, papers, and discussions. Mr. Lumley.

A systematic review of primitive social organization; the forms and development of industry, marriage and the family, the arts of gratification, religion, government; the fact of social evolution; the methods of social evolution such as variation, selection, transmission, adaptation. Additional readings for graduate credit.

667. Social Progress. Three credit hours. Spring Quarter. Textbook, lectures, papers, and discussions. Mr. Hagerty.

A study of the various theories and the criteria of social progress. Extra readings for graduate credit.

668. Community Organization. Three credit hours. Spring Quarter. Three recitations each week. Mr. North.

An analysis of the social problems with which the local community has to deal, their interrelations and their sources in local conditions. Local community agencies and methods of coordinating their resources.

†669. Problems and Policies of Community Chests in Smaller Cities. Three credit hours. Open to graduate students and others by special permission. Mr. Stillman.

A course intended for Council and Chest executives in cities of 100,000 or less. Lectures and discussions. Characterization of social work in small cities; research as a basis for effective procedure; clarifying objectives in local social service organization; democracy and autocracy in social work; relations with member agencies; sympathetic

† Not given during the academic year, 1932-1933.

insight prerequisite to budgeting; raising funds; office procedure; accounting; publicity: the challenge to executive versatility.

670-671. Community Health Organization. Three credit hours. Winter and Spring Quarters. Mr. Paterson.

Methods of organization. Determination and development of programs and budgets. Administrative problems. Relation of voluntary and official health organizations.

675. Field Work. Six to fifteen credit hours. One Quarter. Autumn, Winter, Spring. Open by permission of the instructor. Case Work, Miss Jones; Social Research, Miss Mark; Recreation, Mr. Mason.

Practical work in the fields of family and child welfare, penology, health, industry, or recreation under the supervision of organizations in these fields and the instructor.

695-696. Social Case Work. Three credit hours. 695, Autumn Quarter; 696, Winter Quarter. Open by permission of the instructor. Miss Jones.

A critical analysis of the technique and methods of social treatment, with particular reference to family service and dependent and neglected children.

697. The Case Method in Group Work. Three credit hours. Spring Quarter. Prerequisite, Sociology 695, senior standing in Group Work. Mr. Mason.

The application of the case method to organized group work. The techniques of interviewing, recording, diagnosing, interpretation of data, and treatment, with particular reference to the needs of group work students. Lectures, discussions, and field work.

700. Special Problems. One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, fundamental courses in Sociology, and permission of instructor.

Individual study in some field of social interest.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. History of Sociological Thought. Two credit hours. Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Mr. Lumley.

A survey of the most important literature of sociological theory, preceded by an examination of the writings of the Utopians, the philosophers of history and the social reformers.

805-806-807. American Sociological Theory. Two credit hours. Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Mr. Hagerty.

An intensive study of the theories concerning the origin, development, forms and nature of society, advanced by the leading American sociologists.

813. The Community Chest Movement. Four credit hours. Autumn Quarter. Mr. Stillman.

Origin, development and present status. Its place in the field of welfare finance. The campaign method of money raising. Collecting and auditing subscriptions. The business end of a Community Chest. Study of and report upon the Columbus Community Fund campaign for funds. Analysis of paper organizations of Community Chest of other cities.

814. Contemporary Social Work. Four credit hours. Winter Quarter. Prerequisite, Sociology 813. Mr. Stillman.

An analysis of programs as actually operative in American communities. Methods

of coordination in social work. The Community Chest and Councils of Social Agencies. Making a community program. Functional groupings in the field of social work.

†815. **Interpretation of Social Work.** Four credit hours. Prerequisite, Sociology 813 and 814. Mr. Stillman.

The place of education in a social work program. The message and the method of educational publicity.

†820. **Seminary in Anthropology.** Two credit hours.

*827. **Nationality and Nationalism.** Four credit hours. Autumn Quarter.

A survey of the religious, economic, political, and social backgrounds which underlie the contemporary development of national attitudes.

*828. **Social Classes.** Four credit hours. Winter Quarter.

A study of the basis of individual and group differentiation and the development of cooperation and conflict growing out of contemporary situations.

*829. **Social Changes through Crisis.** Four credit hours. Spring Quarter.

A study of the cause, method, and consequences of social changes, by revolution, war, and economic, political, and scientific innovations.

834. **Development of Social Agencies.** Two credit hours. Autumn Quarter. Mr. Hagerty.

An examination of the principal social welfare agencies, public and private, from the standpoint of their historical development, function, social philosophy and form of organization. Special attention given to the following movements: state care of the poor, charity organization societies, social settlements, the Juvenile Court, probation and parole, child welfare agencies, health agencies, recreation organization, social work of the church and allied organizations, the relation of public and private agencies.

Not open to students who have credit for Sociology 811 or 812 or 661.

835. **The Social Worker and Community Groups.** Three credit hours. Autumn Quarter. Mr. Stillman.

Social work and business, medicine, the church, the school, and so forth; it is concerned with the "raw material" of group thinking and evaluates the social work executive as a specialist in the field of community planning.

836. **National Social Work Agencies and Local Programs.** Three credit hours. Winter Quarter. Prerequisite, Sociology 813. Mr. Stillman.

Their historical development and influence. Contractual relations. Promotion. Education. Specialism. Standards.

†837. **Budgeting Community Social Work.** Three credit hours. Prerequisite, Sociology 813 and 814. Mr. Stillman.

The cost of social work. The influence of the Community Chest movement upon local expenditures for social work. Principles and methods of budgeting. The budget in relation to money raising and social planning.

838. **Social Case Work.** Three credit hours. Autumn Quarter. Miss Jones.

An analysis of present trends in family case work. Consideration of the techniques of diagnosis and treatment. The significance of present-day relief practices.

* Not given in 1932-1933.

† Not given during the academic year, 1932-1933.

839. Contemporary Sociological Literature. One credit hour. Autumn, Winter, and Spring Quarters. Credit may be repeated. Open to all graduate students in Sociology. All instructors.

Reports and discussion of recent literature.

845-846. Methods of Sociological Investigation. Four credit hours. Autumn and Winter Quarters. Required for candidates for advanced degrees in sociology who have not had equivalent work. Miss Mark.

A course designed to prepare students to do independent social research. Students will undertake a class project involving the collection of data.

Not open to students who have credit for Sociology 635-636-637 or 685-686-687.

847-848-849. Research in Penology. One to four credit hours. Autumn, Winter, and Spring Quarters. Open on consent of the instructor. It is assumed that the student who takes this course shall have had one year's work in criminology and penology. Mr. Hagerty.

856. Social Planning. Four credit hours. Autumn Quarter. Mr. North.

A consideration of the relation of culture to human needs. The purposive adaptation of culture to needs. The methods and goals of social effort.

857. The Reconstruction of Western Culture. Four credit hours. Winter Quarter. Mr. North.

A critical examination of modern Western civilization in its bearing on human welfare. Chief attention is given to the various proposals for modifying economic policy, mores, religion, education, international and race relations.

858. Modern Social Movements. Four credit hours. Spring Quarter. Mr. North.

A consideration of the more important modern movements for social amelioration. Their historical development, their underlying social philosophy and the methods employed. Governmental and voluntary agencies for social welfare.

870. Research in Special Problems. Credit to be arranged. Autumn, Winter, and Spring Quarters. Criminology and Penology, Mr. Hagerty; Social Movements, their History, Organization, Methods, Mr. North; History of Sociological Thought, Social Control, Social Evolution, Mr. Lumley; Social Statistics, Miss Mark; Human Migration and Race Problems; Social Work Administration, Mr. Stillman; Rural Social Institutions, Mr. Denune; Social Case Work, Miss Jones; Public Health, Mr. Paterson; Anthropology and the Family, Miss Spaeth; Recreation or Group Work, Mr. Mason.

Individual projects selected and prosecuted in consultation with the instructor.

SOILS

Office, 203 Townshend Hall

PROFESSORS R. M. SALTER AND BRADFIELD, ASSOCIATE PROFESSOR CONREY, ASSISTANT PROFESSORS McCLURE AND BATCHELOR

SUGGESTED OUTLINES

Students majoring in soils can satisfy major requirements, after taking the required courses in agricultural chemistry and soils by electing any two additional courses in this department. A rather wide variety of both related and unrelated courses in other departments is recommended for the remainder of the elective schedule.

For students expecting to teach vocational agriculture, the Soils courses suggested are 405 and 601. For students expecting to follow county agent work or similar pursuits, the Soils courses suggested are 601 and 603.

For the student who is expecting to become a research worker, a teacher in an agricultural college or experiment station, Soils 601, 602, 603, 605, 608, and 609 are recommended. Students majoring in lines other than soils and expecting to do laboratory research work will find Soils 602, 608, and 609 of value in developing laboratory technique.

Graduate students may elect their theses in either physical, chemical, physico-chemical, biological, or management phases of soils, or in classification and surveying. Facilities are provided for laboratory, greenhouse, library, or field studies. Dependent upon the special phase of the subject pursued, it is recommended that additional courses be elected in the chemical, physical, geological, or biological sciences and mathematics. A reading knowledge of German and French is essential for advanced research.

Graduate students wishing a survey of the field of work covered by the Department of Soils will find Soils 601 a satisfactory minor.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in soils in addition to any prerequisites stated in the description of the courses.

601. Theory and Practice of Soil Management. Three credit hours. Autumn Quarter. Three lectures each week. Mr. R. M. Salter.

A review of the more important investigational work with soils and plants as related to field practice.

***602. Chemical Methods Used in Soils Investigations.** Five credit hours. Autumn Quarter. Two lectures and nine laboratory hours each week. Offered in alternate years. Prerequisite, acceptable courses in general chemistry. Mr. McClure.

The fundamentals of inorganic quantitative analysis as applied to soils, fertilizers and liming materials.

603. Origin and Classification of Soils. Three credit hours. Spring Quarter. Two lectures and one three-hour laboratory period each week. Mr. Conrey.

The characteristics of soils as developed under various climatic conditions and their application in soil classification, with special reference to Ohio conditions. Laboratory study of soil characteristics, field trips to several of the important soil areas in Ohio.

***605. Bio-Chemical Analysis of Soils.** Five credit hours. Winter Quarter. Two lectures and three three-hour laboratory periods each week. Offered in alternate years. Prerequisite, Soils 602 or an acceptable course in quantitative analysis and Bacteriology 607 or its equivalent. Mr. Batchelor.

A chemical study of biological processes in soils including nitrogen accumulation and transformations, oxidation, reduction and carbonation. Opportunity will be given properly qualified students to take up minor research problems in any phase of these processes.

608. Physico-Chemical Properties of Soils I. Physical Aspects. Five credit hours. Winter Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite, Soils 602 or an acceptable course in quantitative analysis and a course in physics. A course in physical chemistry is recommended. Mr. Bradfield.

A study of the physical composition and properties of soils, including size distribution of particles, soil-water, soil-air, and temperature relationships, soil structure, and plasticity constants. With special emphasis on the behavior of soils under field conditions.

Not open to students who have credit for Soils 604.

* Not given in 1932-1933.

609. Physico-Chemical Properties of Soils II. Chemical Aspects. Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite, Soils 604. Mr. Bradfield.

The chemical composition of soils and its effect on their colloidal behavior, soil acidity, absorption and exchange of ions, the soil solution and the colloidal chemistry of soil development and reclamation.

Not open to students who have credit for Soils 604.

701. Special Problems. Three to fifteen credit hours. May be taken in units of three to five hours for one or more Quarters. Autumn, Winter, Spring. Prerequisite, Soils 601 or 602. Mr. R. M. Salter, Mr. Bradfield, Mr. Batchelor, Mr. McClure.

Special problems in any phase of soils in which the student may be interested.

FOR GRADUATES

Prerequisite for Graduate Work: Students expecting to major in soils are urged to elect additional courses in general chemistry, qualitative and quantitative analysis, and organic chemistry. In addition to the above, courses in bacteriology, plant physiology, and physical chemistry are suggested.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801. Research in Soils. Five credit hours. Autumn, Winter, and Spring Quarters. Mr. R. M. Salter, Mr. Bradfield, Mr. Batchelor, Mr. McClure.

Opportunity will be given to students who have had satisfactory preliminary training, to carry on library, field, greenhouse, or laboratory research along physical, chemical, or biological lines as related to soils.

802. Soil Seminary. One credit hour. Autumn, Winter, and Spring Quarters. Mr. McClure, Mr. Bradfield, Mr. Conrey.

A weekly conference of graduate students and departmental members in which the research work of members of the seminary or related topics will be discussed.

SPANISH

(See Romance Languages and Literatures)

SURVEY COURSES

PROFESSORS BODE, HENDERSON, LEIGHTON, AND ODEGARD, ASSOCIATE PROFESSORS HULLFISH, REEDER, AND ZORBAUGH, DEAN GAW

FOR ADVANCED UNDERGRADUATES AND GRADUATES

605. Foundations of Contemporary Civilization. Five credit hours. One Quarter. Autumn and Winter. Five meetings each week. Mr. Leighton, Mr. Odegard.

This course is designed for all students majoring in subjects falling within the fields of biological and inorganic sciences, mathematics and psychology. It is elective to other students and may be taken in the second Quarter of the Junior year. It is designed to afford the mature student some insight into the progress of thought in a great province of life to which he has given relatively little attention during his course. The course deals with the changes of thought in religion, ethics, social and political philosophy in relation to the general intellectual and social changes of modern civilization. It concludes with a brief discussion of the chief problems of our present civilization.

608. Development of Modern Science. Five credit hours. One Quarter. Autumn and Winter. Five meetings each week. Mr. Henderson.

This course is designed especially for students who have not majored in science.

Its purpose is to give the non-science student a general view of the historical development of scientific ideas, and to dwell upon the nature and validity of scientific hypotheses and theories from a scientific point of view.

664. Student Economic Problems and the Adviser. Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, an elementary course in economics or the consent of the instructor. Miss Zorbaugh.

This course is for advisers of students in colleges, universities, and high schools, and is open to both men and women.

An economic approach to the functions of an adviser. A study will be made of university students' economic problems, among them being problems relating to the outlay of income, to use of time and energy, and to vocational adjustment. Provision is made for actual experience in counseling students under supervision of the instructor.

It is advisable to supplement this course by Survey 665.

Not open to students who have credit for Psychology 664.

665. Principles of Psychology for Advisers. Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Psychology 401-402, or 407 or the consent of the instructor. Mrs. Gaw.

This course is for advisers of women in colleges, universities, and high schools.

Students may have actual experience in advising younger students under the supervision of the Dean of Women. They will be taught how to advise concerning the scholastic and social orientation of students, and the use and interpretation of records and scholarship as bearing on the personality of the student.

It is advisable to supplement this course by Survey 664.

Not open to students who have credit for Psychology 665.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Survey of Higher Education for College Teachers. Two credit hours each Quarter. Autumn, Winter, Spring. One two-hour session each week. Not open to students majoring in education. Open to all other members of the Graduate School who are now teachers in the University or who are preparing to teach in colleges and universities. Survey 801 is a prerequisite for admission to 802. Survey 802 is a prerequisite for admission to 803. Mr. Bode, Mr. Hullfish, Mr. Reeder.

This course will deal with the function of the college in a democratic social order, the historical background and points of view of the present college, the administrative policies, the organization of subject matter and the development of methods of instruction for the purpose of making the college realize the function proposed, the special problems of teaching college students, and methods of evaluating the effectiveness of instruction.

VETERINARY MEDICINE

Office, 103 Veterinary Laboratory

PROFESSORS BRUMLEY, GROSSMAN, GOSS, GUARD, AND SCHALK, ASSOCIATE PROFESSORS HOBBS, EDGINGTON, AND BROERMAN, ASSISTANT PROFESSOR REBRASSIER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

NOTE: A senior whose full time is not required for the completion of work for his baccalaureate degree may select certain courses for graduate credit, *but in order to do this the permission of the Graduate Council must be obtained before registering for the course.*

620. Histologic Technique. Two to five credit hours. One Quarter.

Autumn, Winter, Spring. Laboratory work, three hours for each credit hours. Mr. Grossman.

The course deals with the examination of the tissues with the aid of microscope. The important methods in the preparatory steps required in collecting specimens, fixation, embedding, sectioning, staining, and mounting are considered.

621. Pathology Technique. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Mr. Goss.

Practice in the methods of laboratory diagnosis, consisting of collecting the specimens, their fixation and embedding, and the sectioning of such tissues, together with practice in laboratory diagnosis and the recognition of disease processes in tissues.

Not open to students who have credit for Veterinary Medicine 821.

622. Advanced Special Pathology. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Prerequisite, Veterinary Medicine 621. Mr. Goss.

An advanced course in the pathology of infectious diseases with special reference to anatomical and microscopical lesions and methods of diagnosis together with detailed studies of the lesions of specified diseases under consideration.

623. Parasitology Technique. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Prerequisite, one course in general pathology and a course in parasitology. Mr. Rebrassier.

624. Special Problems in Veterinary Surgery. One to five credit hours. Spring Quarter. Mr. Guard.

Advanced work in surgery or sterility.

625. Advanced Veterinary Anatomy. Three or five credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, a course in the topographic anatomy of domestic animals. Mr. Grossman.

626. Special Problems in Veterinary Medicine. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Brumley, Mr. Schalk, Mr. Hobbs, Mr. Broerman, Mr. Edgington.

FOR GRADUATES

Prerequisite for Graduate Work: The required training in pathology and the permission of the instructor.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

822. Special Anatomical Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

Special problems in gross and microscopic pathology with regard to the accommodation of the course to particular projects which may be given due consideration.

823. Special Bovine Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

This is to accommodate those students doing graduate work in some special fields of bovine pathology. The selection of projects is quite variable, allowing for special problems in this field.

824. Special Pathology Problems. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

This is an advanced course in pathology to accommodate special fields not otherwise covered by specific courses.

825. Special Poultry Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

This course allows for the study of poultry diseases with specialization in any pathological processes concerned with poultry diseases.

826. Special Parasitology Problems. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Rebrassier.

827. Research in Special Problems in Veterinary Anatomy. Three or five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Grossman.

Students will select or have special problems assigned to them for study.

828. Research in Veterinary Surgery. Five or ten credit hours. One Quarter. Autumn, Winter, Spring. Open only to graduates of recognized veterinary colleges except upon the recommendation of the professor in charge of the course and the Dean of the College. Mr. Guard.

Special problems connected with surgical pathology, surgical technique, or sterility of animals.

829. Research Problems in Veterinary Medicine. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Brumley, Mr. Schalk, Mr. Hobbs, Mr. Edgington, Mr. Broerman.

VOCATIONAL EDUCATION

(See Practical Arts and Vocational Education)

ZOOLOGY AND ENTOMOLOGY

Office, 101 Botany and Zoology Building

PROFESSORS OSBURN, OSBORN (RESEARCH), BARROWS, DeLONG, AND PETERSON, ASSOCIATE PROFESSORS KENNEDY AND SNYDER, ASSISTANT PROFESSORS KOSTIR, D. F. MILLER, AND PRICE, MR. DUNHAM

ZOOLOGY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in zoology. Courses 605, 607, 615, 616, and 617 require also two additional Quarters of biological science. For 601, 605, and 607, permission of the instructor is required.

601. Advanced Studies in Animal Heredity. Three credit hours. One Quarter. Autumn, Winter, Spring. One lecture and two laboratory periods each week. Mr. Snyder.

A portion of this course will be devoted to the study of recent advances in the field of animal heredity, but a large part of the work will consist in the breeding of animals in the laboratory and the analysis of data collected.

605. Animal Behavior. Three credit hours. Autumn Quarter. One lecture each week, the remainder laboratory work. Permission of instructor is required. Mr. Barrows.

This course is devoted to the study of the functions of the various parts of the nervous system of the invertebrates, with emphasis on the mechanics of adjustment to heat, light, chemical, and mechanical stimulation. Considerable time will be spent on experiments with living worms and insects.

606. Animal Behavior. Three credit hours. Winter Quarter. One lecture each week, the remainder laboratory work. Permission of the instructor is required. Mr. D. F. Miller.

This course is devoted to the study of the responses of insects to the stimulating

factors of their environment. These studies are directed toward the types of behavior which are important in insect control.

607. Animal Behavior. Three credit hours. Winter Quarter. One lecture each week, the remainder laboratory work. Courses in comparative anatomy and comparative neurology are desirable. Permission of instructor is required. Mr. Barrows.

This course is devoted to the study of the various parts of the nervous system of the lower vertebrates and to the mechanics of adjustment to various kinds of stimulation. Considerable time will be spent on experiments with living fish and guinea pigs.

609. Animal Microtechnic. Three or five credit hours. Spring Quarter. A laboratory course. Laboratory work, assigned readings, and conferences. This course is designed for students intending to major in one of the biological sciences. The class is limited to twelve students and permission of the instructor must be obtained before registering for the course. Mr. Kostir.

Theory and practice of microscopic methods, including fixing, embedding, sectioning, and staining of animal tissues, making permanent preparations, and special manipulation of the microscope and its accessories.

Not open to students who have credit for Zoology 407.

617. Cellular Biology I. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Permission of the instructor must be obtained before registering for this course. Mr. Kostir.

A study of the organization of living cells and the fundamental phenomena of life.

618. Cellular Biology II. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Prerequisite, a course in heredity. Zoology 617 is desirable, but not essential. Mr. Kostir.

A study of the physical basis of heredity, variation, and evolution.

620. Advanced Zoology of Vertebrates. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. A course in evolution and one Quarter in comparative anatomy are also desirable. Mr. Price.

A study of the various vertebrate groups, emphasizing their origin, phylogeny, classification, life histories, habits, distribution, and economic importance. Laboratory, museum and field work. Especially recommended for students specializing in biological science.

625. Advanced Zoology of Invertebrates I. The Protozoa. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

Zoology 625, 626 and 627 are fundamental courses designed to give the student a general knowledge of the structure, life histories, habits, and relationships of the invertebrate animals. While it is preferable that these courses be taken in the order given, this is not essential, and any one of the three may be elected independently of the others. Course 625 deals with the Protozoa, including both free-living and parasitic forms.

Not open to students who have credit for Zoology 615.

626. Advanced Zoology of Invertebrates II. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of sponges, coelenterates, worms, and arthropods, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

Not open to students who have credit for Zoology 616.

627. Advanced Zoology of Invertebrates III. Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of molluscs, echinoderms, brachiopods, and bryozoa, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

701. Special Problems. Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Zoology 625-626-627 or an acceptable course in economic entomology or equivalent, and permission of the instructor.

After conference with the professor in charge, the subject for investigation may be selected in one of the following: animal reactions, arachnology (Mr. Barrows); protozoology, cellular biology (Mr. Kostir); ichthyology (Mr. Osburn); genetics (Mr. Snyder); apiculture (Mr. Dunham); life history development, morphology, classification or some other phase of zoological study (various professors).

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Principles of Education, Course 705.

FOR GRADUATES

Prerequisite for Graduate Work: Students expecting to major in this department must be familiar with the elements of related sciences, and must have had at least two years of work in zoological subjects. It is desirable also that the student should have a reading knowledge of French and German.

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Seminary in Zoology. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Osburn.

Discussion of assigned subjects, reports on research work, current literature, etc. All graduate students in the department are expected to register in this course as long as they are in residence.

805-806-807. Invertebrate Zoology. Five credit hours. Autumn, Winter, and Spring Quarters. Mr. Osburn.

A detailed study of invertebrate groups with special reference to morphologic features and discussions of their significance in adaptation, phylogeny, and taxonomy.

***808-*809. Invertebrate Embryology.** Three or five credit hours. Autumn and Winter Quarters. Lectures, reading, and laboratory. Prerequisite, the equivalent of Entomology 651-652, or Zoology 805-806-807. Mr. Osburn.

811-812-813. Research Work. Subject to be chosen after consultation. Three to ten credit hours each Quarter. Offered every Quarter and may be repeated as often as is necessary in pursuit of special

* Not given in 1932-1933.

research. Mr. Osburn, Mr. Osborn, Mr. Barrows, Mr. DeLong, Mr. Peterson, Mr. Kennedy, Mr. Kostir, Mr. Snyder.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

ENTOMOLOGY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Prerequisite for All Courses in This Group: Fundamental courses in zoology and entomology in addition to any prerequisites stated in the description of the courses.

651-652. Advanced Entomology. Five credit hours. Autumn and Winter Quarters. Two lectures and three two-hour laboratory periods each week. Mr. Kennedy.

Advanced entomology for those wishing to investigate some special group of insects or to fit themselves for professional work in entomology.

Entomology 651 deals with the comparative external morphology, the evolutionary history and classification of insects; laboratory work is systematic and material will be furnished, but it will be preferable if the student collects and pins material for himself during the summer preceding.

Entomology 652 deals with insect behavior, life histories, and particularly with ecological principles governing occurrence and distribution of insect species, and the principles underlying insect control.

The laboratory work is systematic. The two Quarters cover all the insect orders.

653-654. Insect Control. Five credit hours. Autumn and Spring Quarters. Two lectures and three laboratory periods each week. Mr. DeLong.

Principles of economic entomology, circumvention and exclusion, cultural methods, traps and trap crops, heat, animal dips, insecticides, insecticide machinery, and accessories, and practical work in fumigation, spraying, inspecting, preparing an entomological exhibit and a collection of economic insects, rearing and insectary methods. Practical course intended to anticipate, so far as possible, the requirements and difficulties which the student will encounter in state or federal entomological work.

655. Medical and Veterinary Entomology. Five credit hours. Winter Quarter. Three lectures and two laboratory periods each week. Given biennially. Mr. DeLong.

The insects, mites, and ticks which cause or transmit diseases of man and domestic animals; the sources of infection, methods of transmission and interrelation with pathogenic bacteria and protozoa; the relations of the subjects to parasitology, bacteriology, veterinary medicine, sanitary engineering and public health; field observations of unsanitary conditions, practice in feeding, breeding and handling experimental insects, and practical problems in the control of parasites and insect-borne diseases.

The student is advised if possible to take Zoology 504 (Animal Parasites) before electing this course.

660. Entomological Literature and Principles of Taxonomy. Five credit hours. Winter Quarter. Mr. Kennedy.

Lectures on the development of entomological writing, studies of Government and Experiment Station bulletins and other publications, assigned readings, and preparation by each student of a report or review upon some publication. Intended to familiarize the student with past and current publications and give him command of the published records in his field of study.

A study of the principles of classification with lectures on taxonomic systems,

codes of nomenclature, etc. Practical work in the classification of a selected group or groups of insects or other animals.

Not open to students who have credit for Entomology 456.

701. Special Problems. Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Zoology 625-626-627 or an acceptable course in economic entomology or equivalent, and permission of the instructor.

A conference with the professor in charge of the subject for investigation may be selected in one of the following: insect reaction, arachnology (Mr. Barrows); apiculture (Mr. Dunham); life history development, morphology, taxonomy of various orders, or some other phase of entomological study (various professors).

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the "800" group except by permission of the Graduate Council.

801-802-803. Seminary in Entomology. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Osborn, Mr. Peterson, Mr. Kennedy.

Discussion of assigned subjects, reports on research work, current literature, etc. All graduate students in the department are expected to register in this course as long as they are in residence.

811-812-813. Research Work. Subject to be chosen after consultation. Three to ten credit hours each Quarter. Offered every Quarter and may be repeated as often as is necessary in pursuit of special research. Mr. Osburn, Mr. Osborn, Mr. Barrows, Mr. Peterson, Mr. DeLong, Mr. Kennedy, Mr. D. F. Miller.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

814-815. Biological Control of Insect Pests. Five credit hours. Autumn and Winter Quarters. Three lectures and two two-hour laboratory periods each week. Each Quarter is a unit in itself and may be taken independently of the other. Open to graduate students in entomology with the consent of the instructor. Mr. Peterson.

An advanced course dealing with the biological agents which bring about a balance or control among insects. During the Autumn Quarter diseases of insects, chiefly bacterial and fungous, and vertebrate and invertebrate predators of insects will be considered. During the Winter Quarter parasites of insects, chiefly parasitic insects, will be considered. The laboratory work will consist largely of special assigned problems.

816. Research Methods: Living Insects. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Open to graduate students in entomology with the consent of the instructor. Mr. Peterson.

A course designed for the purpose of introducing students to methods and equipment employed today in the field by research entomologists. Various topics will be considered, namely: insectary construction, rearing cages and containers, temperature, moisture and light control equipment, traps and barriers, estimating insect populations, methods of taking notes, compiling data and manner of presentation and other useful information for entomologists now in or expecting to enter field research work. The laboratory work will consist largely of special assigned problems.

817. Morphology and Development of Insects. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Kennedy.

An advanced comprehensive course on the internal structures of insects, together with what is known of their functions, morphology, histology, embryology, and metamorphosis. The laboratory is handled as an individual research problem for each student and may be continued in succeeding Quarters as research.

The success of this work depends on the material collected and preserved by the student preceding the course. Methods for collecting and preserving material should be taken up with the instructor in charge at the end of the Spring Quarter preceding. Students coming from other institutions are expected to write for instructions.

Not open to students who have credit for Entomology 656.

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